PROJECT MANUAL

North Rockland High School
Phase 1 Projects

For

North Rockland Central School District
65 Chapel Street
Garnerville, New York 10923

High School: SED# 50-02-01-06-0-016-035
Press Box (Demo): SED# 50-02-01-06-7-026-001
Concessions-Press Box (New): SED# 50-02-01-06-7-079-001
Fieldhouse: SED# 50-02-01-06-7-008-001

MICHAEL SHILALE ARCHITECTS, L.L.P.

140 Park Avenue New City, NY 10956
TEL 845-708-9200 FAX 845-708-9222
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MSA File No. 42051
Bidding Documents
February 2nd ,2023
Rev: 01-27-23

Michael Shilale, AIA, LEED, CPHC
John Cirilli, AIA, LEED

MICHAEL SHILALE ARCHITECTS, L.L.P.

140 Park Avenue ☐ New City, New York 10956 ☐ Tel 845-708-9200 ☐ Fax 845-708-9222 ☐ E-mail info@shilale.com

October 28, 2022

Wendy Clark
NYS EDUCATION DEPARTMENT
360 Education Building Annex
Albany, NY 12234

Re: North Rockland High School Projects – Phase 1
High School SED No. 50-02-01-06-0-016-035
Fieldhouse SED No. 50-02-01-06-7-008-001

MSA Project No. 42051

Dear Ms. Clark,

The undersigned certifies that to the best of his knowledge, information and belief, the plans and specifications are in accordance with the applicable requirements of the New York State Uniform Fire Prevention and Building Code, The State Energy Conservation Code and The Building Standards, of the New York State Education Department. I further certify that no new asbestos containing material will be specified to be used in construction, and that any ABCM will be treated in accordance with industrial code rule #56.

Work will involve known or suspected ACBM, and will be done in accordance with Industrial Code Rule #56. Testing result documentation on ACBM is shown in specification section 003126 Existing Hazardous Material Information. Work involving ACBM is detailed in specification section 020800 Asbestos Abatement Procedures.

If you require any additional assistance, please contact me at the office.

Sincerely,

MICHAEL SHILALE ARCHITECTS, LLP

Michael R. Shilale, AIA, LEED, CPHC
Partner

Cc: Paul Rooney (NRCSD)
Michael Senno (NRCSD)
John P. Cirilli, AIA, LEED (MSA)

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October 28, 2022

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NYS EDUCATION DEPARTMENT
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Albany, NY 12234

Re: North Rockland High School Projects – Phase 1
Press Box (Demo) SED No. 50-02-01-06-7-026-001

MSA Project No. 42051

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I further certify that no new asbestos containing material will be specified to be used in construction, and that any ABCM will be treated in accordance with industrial code rule #56.

The work will not involve known or suspected ACBM as evidenced by bulk or destructive testing as shown in specification section 003126 Existing Hazardous Material Information.

If you require any additional assistance, please contact me at the office.

Sincerely,

MICHAEL SHILALE ARCHITECTS, LLP

Michael R. Shilale, AIA, LEED, CPHC
Partner

Cc: Paul Rooney (NRCSD)
Michael Senno (NRCSD)
John P. Cirilli, AIA, LEED (MSA)

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October 28, 2022

Wendy Clark
NYS EDUCATION DEPARTMENT
360 Education Building Annex
Albany, NY 12234

Re: North Rockland High School Projects – Phase 1
Concessions-Press Box (New) SED No. 50-02-01-06-7-079-000

MSA Project No. 42051

Dear Ms. Clark,

The undersigned certifies that to the best of his knowledge, information and belief, the plans and specifications are in accordance with the applicable requirements of the New York State Uniform Fire Prevention and Building Code, The State Energy Conservation Code and The Building Standards, of the New York State Education Department.
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NOTICE TO BIDDERS

The BOARD of Education of the North Rockland Central School District (in accordance with section 103 of Article 5-a of the General Municipal Law) hereby invites the submission of sealed bids on:

BID NO.	ITEM	DUE DATE
	North Rockland High School Projects- Phase 1	03-14-23

SEALED BIDS will be received until 2:00 P.M. in the office of facilities, on the date specified above, at the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923, at which time and place they will be publicly opened and read.

Bids will be received for contracts covering all work related to the North Rockland High School Projects- Phase 1 for the North Rockland Central School District, as described in the plans and specifications.

A site inspection and pre-bidders' conference has been scheduled promptly at 3:00pm on the 22nd day of February, at North Rockland High School, 106 Hammond Road, Thiells, NY 10984.

Complete digital sets of Bidding Documents, drawings, and specifications, may be obtained online as a download at the following website: www.shilaleplanroom.com under 'public projects.' Requests for information may be submitted through www.bidnet.com or emailed to bidding@shilale.com.

Complete sets of Bidding Documents, Drawings and Specifications, may be obtained from Rev, 330 Route 17A, Suite #2, Goshen, New York 10924 Tel: 1-877-272-0216, upon depositing the sum of $100.00 for each combined set of documents. Checks or money orders shall be made payable to North Rockland Central School District. Plan deposit is refundable in accordance with the terms in the Instructions to Bidders to all submitting bids. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.

All bid addenda will be transmitted to registered plan holders via email and will be available at www.shilaleplanroom.com . Plan holders who have paid for hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda.

AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

Sample

THE OWNER:
(Name, legal status, address, and other information)

THE ARCHITECT:
(Name, legal status, address, and other information)

TABLE OF ARTICLES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

.1 the Bidder has read and understands the Bidding Documents;

.2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;

.3 the Bid complies with the Bidding Documents;

.4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;

.5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and

.6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount

of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:
(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

SECTION 001200-SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

GENERAL

A. AIA Documents A701, 2018 Edition, "Instruction To Bidders", and its provisions, shall be considered an incorporated portion of Contract, unless specifically indicated to be omitted.

B. Where any Article of AIA A701, 2018 Edition, is modified by alteration, addition or deletion, provisions of such article shall remain in effect. All modifications shall be considered as added thereto. Where any such Article is amended, voided or superseded thereby, provisions of such Article not so specifically amended, voided or superseded shall remain in effect.

ARTICLE 1: DEFINITIONS

A. To paragraph 1.6, add the following: " For additional requirements refer to Specification Section 01230-ALTERNATES."

B. Add paragraph 1.10 as follows: " Where the term Architect or Engineer appears in the Documents, same refers to Michael R. Shilale Architects."

C. Add paragraph 1.11 as follows: " For the purpose of the Documents, where the term Contractor appears in the Documents, same refers to the successful Contractor."

ARTICLE 2: BIDDER'S REPRESENTATIONS

A. No modifications.

ARTICLE 3: BIDDING DOCUMENTS

3.1 COPIES

A. To subparagraph 3.1.1 delete the second sentence and replace with the following: "The deposit for each set will be refunded upon the return of the Contract Documents in good condition not later than thirty (30) days after the receipt of Bids."

B. To subparagraph 3.1.1 add the following: "For bidding Documents to be deemed in good condition, they must be returned bound as issued, legible and containing only the markings necessary for bidding purposes."

C. Add subparagraph 3.1.5 as follows: " Drawings and Project Manuals may be examined at the following locations:

1. Michael Shilale Architects, L.L.P
   140 Park Avenue
   New City, NY 10956

2. Office of Buildings and Grounds, NRSCD
   65 Chapel Street
   Garnerville, NY 10923

3. REVplans
   330 Route 17A
   Goshen, NY 10924

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

A. Add subparagraph 3.2.4 as follows: " In the absence of an interpretation by the Architect or Engineer, should the Drawings disagree in themselves or with the Specifications, the better quality, the more costly or the greater quantity of work or materials shall be estimated upon, and unless otherwise ordered, shall be furnished."

3.3 SUBSTITUTIONS

A. Add subparagraph 3.3.5 as follows: " In the Specifications, two or more kinds, types, brands, or manufacturers or materials are named, are regarded as the required standard of quality, and are presumed to be equal. The Contractor mat select one of these items or, if the Contractor desires to use any kind, type, brand, manufacturer or material other than those named in the Specification, he shall indicate in writing, when requested, and prior to the award of Contract, what kind, type, brand or manufacturer is included in the Base Bid for the specified item."

3.4 ADDENDA

A. To subparagraph 3.4.1 add the following: " All such Addenda shall become part of the Contract Documents and all Bidders shall be bound by such Addenda, whether or not received by the Bidders."

B. To subparagraph 3.4.3 delete this paragraph and replace with the following: " No Addenda will be issued later than two (2) working days prior to the date for receipt of bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids."

ARTICLE 4: BIDDING PROCEDURE

4.2 BID SECURITY

A. Add subparagraph 4.2.4 as follows: " Bids shall be accompanied by a Bid Security of not less than five percent (5%) of the amount of the Bid. Such Bid Security shall be submitted in the form of a Certified Check or Bid Bond made payable to the Owner. The submission shall be made with the understanding that the Bid Security shall guarantee that the Bidder will not withdraw his Bid for a period of forty five (45) days after the scheduled closing time for the receipts of Bids; and that if his Bid is accepted will enter into a formal contract with the Owner in accordance with the Form of Agreement included as part of the Contract Documents, and that the required Performance and Payment Bonds will be given; and that in the vent of the withdrawal of said Bonds within ten (10) days after he has received notice of the acceptance of his bid, the Bidder shall be liable to the Owner for the full amount of the Bid Guarantee as representing the damage to the Owner as result of the default of Bidder in any particular hereof."

B. Add subparagraph 4.2.5 as follows: " The Bid Securities shall be returned to all except the (3) three lowest Bidders within three (3) days after the formal opening of Bids. The remaining Bid Securities will be returned to the three (3) lowest Bidders within forty-eight (48) hours after the Owner and the accepted Bidder have executed the Contract and the executed Performance and Payment Bonds have been approved by the owner. If the required Contract and Bonds have not been executed within forty-five (45) days after the date of the opening Bids, then the Bond of any Bidder will be returned upon his request, provided he has not been notified of acceptance of his Bid prior to the date of such request.

4.4 MODIFICATION OR WITHDRAWAL OF BIDS

A. Delete subparagraph 4.4.1 as written and replace with the following: " A Bid may not be withdrawn, modified or canceled for a period of forty-five (45) days after the scheduled closing time for the receipt of Bids, and each Bidder so agrees in submitting a Bid."

ARTICLE 5: CONSIDERATION OF BIDS

5.3 ACCEPTANCE OF BID (AWARD)

A. To subparagraph 5.3.1 add the following: " The Owner may consider informal any Bid not prepared and

submitted in accordance with all provisions of the Bidding Documents."

ARTICLE 6: POST-BID INFORMATION

6.3 SUBMITTAL

A. Add subparagraph 6.3.5 as follows: " For additional requirements refer to General Conditions AIA A201, paragraph 5.2 AWARD OF SUBCONTRACTS & OTHER CONTRACTS FOR PORTIONS OF THE WORK."

ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

7.2 TIME OF DELIVERY AND FORM OF BONDS

A. To subparagraph 7.2.1 delete the first sentence and replace with the following: " The successful Bidder shall deliver the required Bonds to the Owner simultaneously with the executed Contract."

B. To subparagraph 7.2.2 add the following: " The Performance and Payment Bonds shall have as surety there under such surety company or companies as are acceptable to the Treasury Department of the United States on Bonds given to the United States Government, and are authorized to do business in the State of New York. Premium on such Bonds shall be included in the Bid."

ARTICLE 8: FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. No modifications.

Add " ARTICLE 9: SUPPLEMENTARY INSTRUCTIONS"

Add " 9.1 EXECUTION OF CONTRACT"

A. Add subparagraph 9.1.1 as follows: " Successful Bidder shall, within ten (10) days after notification of him that the Contract is ready for execution, execute in triplicate and deliver to Owner all executed counterparts of Contract in form set forth in the Contract Documents."

B. Add subparagraph 9.1.2 as follows: " Upon request by owner, successful Bidder shall, if corporation or an unincorporated association, file Certificate, evidencing fact that it is authorized to do business in the State of New York, or if conducting business under Assumed Name, file Count Clerk's Certificate to conduct business under such Assumed Name, and/or if conducting business as Partnership, file County Clerk's Certificate, evidencing filing with such Clerk of Certificate of Partnership."

C. Add subparagraph 9.1.3 as follows: " Simultaneously with their delivery of executed Contract, successful Bidders shall deliver copies of Certificate of Insurance (AIA Form G705, 1978) for insurance specified in the Contract Documents."

Add" 9.2 UNIT PRICES"

A. None at this time.

Add" 9.3 APPLICABLE STATE AND COUNTY SALES TAX"

A. Add subparagraph 9.3.1 as follows: " New York State & County Taxes: The Owner has stated that all materials supplied in connection with the requirements of Work of this Contract are not subject to application of such Sales Tax. Should such Sales Taxes be imposed, Owner agrees that Contract Sum shall be increased by full amount of all such taxes."

END OF SECTION

SECTION 002100 – HIGHWAY LETTER

PART 1 - GENERAL

1.01 SUMMARY

A. The following information in this section is provided for informational purposes only and shall not become part of the contract documents.

1. Highway Letter dated 10-06-22.

Michael Shilale, AIA, LEED, CPHC
John Cirilli, AIA, LEED

MICHAEL SHILALE ARCHITECTS, L.L.P.

140 Park Avenue ☐ New City, New York 10956 ☐ Tel 845-708-9200 ☐ Fax 845-708-9222 ☐ E-mail info@shilale.com

October 6, 2022

Charles H. Vezzetti
Highway Superintendent
Rockland County Highway Department
23 New Hempstead
New City, New York 10956

Re: North Rockland High School Projects – Phase 1
High School SED No. 50-02-01-06-0-016-035
Press Box (Demo) SED No. 50-02-01-06-7-026-001
Concessions-Press Box (New) SED No. 50-02-01-06-7-079-000
Fieldhouse SED No. 50-02-01-06-7-008-001

MSA Project No. 42051

Gentlemen:

On behalf of North Rockland Central School District and in conformance with the requirements of the New York State Education Department, we hereby notify you of the above referenced project.

The scope of work involves North Rockland High School Projects – Phase 1 at North Rockland Central School District. There are no proposed entries or exits on public highways and storm drainage will not be increased.

Complete sets of contract documents are available at the district office for review. If you should have any questions on the enclosed, please do not hesitate to contact our office.

Sincerely,

MICHAEL SHILALE ARCHITECTS, L.L.P

John P. Cirilli, AIA, LEED
Partner

cc: Paul Rooney (NRCSD)
Michael Senno (NRCSD)
Michael R. Shilale, AIA, LEED, CPHC (MSA)

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PART 1 - GENERAL

1.01 GENERAL

A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

_____
(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials, and equipment for North Rockland High School Projects- Phase 1 – General Construction, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "North Rockland High School Projects- Phase 1– General Construction at North Rockland High School, 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923 ", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1._____Dollars
(Write out in words)
(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

A. North Rockland High School Projects- Phase 1

Total Project General Construction ($_____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 20 – Include Weight Room sports floor.

($_____)

Alternate No. 21 – Masonry cleaning full North/East side of annex.

($_____)

Alternate No. 30 – HVAC Unit H1 structural reinforcement.

($_____)

Alternate No. 31 – HVAC Unit K1 structural reinforcement.

($_____)

Alternate No. 40 – New metal roofing instead of new asphalt shingles

($_____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No. 2 – General Construction testing

($_____)

Allowance No. 6 – Abatement for weight room and Fieldhouse

($125,000 _____)

Allowance No. 20 – Rake & repoint existing masonry for weight-locker exterior (750 SF). See drawing a-220.

($_____)

Allowance No. 40 – Rake & repoint existing masonry for Fieldhouse exterior (500 SF).

($_____)

Allowance No. 41 – Allowance for 320 SF of roof sheathing replacement for Fieldhouse

($_____)

Allowance No. 42 – 200 SF of foundation block repair

($_____)

1.02 TIME OF COMPLETION

A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, he will start work on _____ 2023. Substantial completion will be _____, 2023. The punch list work will be completed by _____ 2023 and performed after school hours.

1.03 BID SECURITY

A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

Unit Price No. 10 – Removal of Rock per cubic yard.(Concession Stand & Fieldhouse)

($_____)

Unit Price No.41 –Provide a price to add or reduce roof sheathing replacement amount by 32 Sq Ft.

($_____)

A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality, and function.

Unit Price No. 10 – Removal of rock per cy (concession/press box).

($_____)

Unit Price No. 41 – Provide a price to add or reduce roof sheathing replacement amount add/reduce by 32 SF.

($_____)

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not submit a bid for the purpose of restricting competition.

Resolved that _____
(Name of Individual)
be authorized to sign and submit the bid or proposal of this corporation for the following project _____and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by
_____
Corporation at a meeting of its Board of Directors held on the
_____day of_____, 20_____.

(SEAL OF THE CORPORATION)

_____
Secretary

1.07 ACCEPTANCE

A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

A. The undersigned hereby represents that it is a_____
(Corporation, Partnership, or an Individual). If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under laws of New York State and it is authorized to do business in this State.

1.10 PLACE OF BUSINESS

A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed or delivered.

_____
(Name)

_____
(Address)

_____
(Telephone)

1.11 EXECUTION OF CONTRACT

A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.12 ADDENDA

A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____

1.13 ASBESTOS

A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated_____, 20_____ _____

Legal Name of Person, Partnership or Corporation

By _____

Title _____

Address _____

_____

_____

PART 1 - GENERAL

1.01 GENERAL

A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

_____
(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials, and equipment for UV Replacement at Haverstraw Elementary School – Mechanical, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "North Rockland High School Projects- Phase 1 – Mechanical at North Rockland High School, 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1._____Dollars
(Write out in words)
(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

A. North Rockland High School Projects- Phase 1

Total Project Mechanical Construction ($_____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 30 – Remove and replace unit H1.

($_____)

Alternate No. 31 – Remove and replace unit K1.

($_____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No. 3 – Mechanical testing.

($_____)

Allowance No. 30 - Contractor shall include allowance to clean 20 LF of existing ductwork per unit.

($_____)

Allowance No. 31 – Perform commissioning of installed air handling equipment for all units.

($_____)

1.02 TIME OF COMPLETION

A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, he will start work on _____, 2023. Substantial completion will be _____, 2023. The punch list work will be completed by _____, 2023 and performed after school hours.

1.03 BID SECURITY

A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality and function.

No unit prices at this time.

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not submit a bid for the purpose of restricting competition.

Resolved that _____
(Name of Individual)
be authorized to sign and submit the bid or proposal of this corporation for the following project _____and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by

_____

Corporation at a meeting of its Board of Directors held on the
_____day of_____, 20_____.

(SEAL OF THE CORPORATION)

_____
Secretary

1.07 ACCEPTANCE

A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

A. The undersigned hereby represents that it is a_____
(Corporation, Partnership, or an Individual). If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under laws of New York State and it is authorized to do business in this State.

1.10 PLACE OF BUSINESS

A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed or delivered.

_____
(Name)

_____
(Address)

_____
(Telephone)

1.11 EXECUTION OF CONTRACT

A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.12 ADDENDA

A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____

Addendum #_____ Dated_____

1.13 ASBESTOS

A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated_____, 20_____ _____
Legal Name of Person, Partnership
or Corporation

By _____

Title _____

Address _____

_____

_____

PART 1 - GENERAL

1.01 GENERAL

A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

_____
(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials and equipment for North Rockland High School Projects- Phase 1, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "North Rockland High School Projects- Phase 1 – Electrical at 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923 ", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1._____Dollars
(Write out in words)
(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

A. North Rockland High School Projects- Phase 1

Total Project Electrical ($_____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 30 – Electrical work for removal and replace unit H1.

($_____)

Alternate No. 31 – Electrical work for removal and replace unit K1.

($_____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No. 5 – Electrical testing.

($_____)

1.02 TIME OF COMPLETION

A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, he will start work on _____ 2023. Substantial completion will be _____2023. The punch list work will be completed by _____ 2023 and performed after school hours.

1.03 BID SECURITY

A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality and function.

No unit prices at this time

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not submit a bid for the purpose of restricting competition.

Resolved that _____
(Name of Individual)
be authorized to sign and submit the bid or proposal of this corporation for the following project
_____and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by
_____
Corporation at a meeting of its Board of Directors held on the
_____day of_____, 20_____.

(SEAL OF THE CORPORATION)

_____
Secretary

1.07 ACCEPTANCE

A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

A. The undersigned hereby represents that it is a_____
(Corporation, Partnership, or an Individual). If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under laws of New York State and it is authorized to do business in this State.

1.10 PLACE OF BUSINESS

A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed or delivered.

_____
(Name)

_____
(Address)

_____
(Telephone)

1.11 EXECUTION OF CONTRACT

A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.12 ADDENDA

A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____

1.13 ASBESTOS

A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated_____, 20_____ _____
Legal Name of Person, Partnership
or Corporation

By _____

Title _____

Address _____

_____

_____

PART 1 - GENERAL

1.01 GENERAL

A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

_____
(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials and equipment for North Rockland High School Projects- Phase 1, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "North Rockland High School Projects- Phase 1 - Plumbing at 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923 ", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1._____Dollars
(Write out in words)
(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

A. North Rockland High School Projects- Phase 1

Total Project Electrical ($_____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

No alternates at this time.

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No. 4 – Plumbing testing.

($_____)

1.02 TIME OF COMPLETION

A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, he will start work on _____ 2023. Substantial completion will be _____2023. The punch list work will be completed by _____ 2023 and performed after school hours.

1.03 BID SECURITY

A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality and function.

No unit prices at this time

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not submit a bid for the purpose of restricting competition.

Resolved that _____
(Name of Individual)
be authorized to sign and submit the bid or proposal of this corporation for the following project
_____and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by
_____
Corporation at a meeting of its Board of Directors held on the
_____day of_____, 20_____.

(SEAL OF THE CORPORATION)

_____
Secretary

1.07 ACCEPTANCE

A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a

period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

A. The undersigned hereby represents that it is a_____
(Corporation, Partnership, or an Individual). If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under laws of New York State and it is authorized to do business in this State.

1.10 PLACE OF BUSINESS

A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed or delivered.

_____
(Name)

_____
(Address)

_____
(Telephone)

1.11 EXECUTION OF CONTRACT

A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.12 ADDENDA

A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____

1.13 ASBESTOS

A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated_____, 20_____ _____
Legal Name of Person, Partnership
or Corporation

By _____

Title _____

Address _____

_____

_____

PART 1 - GENERAL

1.01 GENERAL

A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

_____
(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials and equipment for North Rockland High School Projects- Phase 1, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "North Rockland High School Projects- Phase 1 - Sitework at 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923 ", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1._____Dollars
(Write out in words)
(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

A. North Rockland High School Projects- Phase 1

Total Project Sitework ($_____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 02 – Provide sod in place of grass seed.

($_____)

Alternate No. 03 – Shot put – 2nd station.

($_____)

Alternate No. 04 – Track surface color accent.

($_____)

Alternate No. 05 – Turf infill (sustainable).

($_____)

Alternate No. 06 –Provide 16 VIP Bucket seats with 2 additional for attic stock.

($_____)

Alternate No. 07 – Culvert Replacement.

($_____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No. 1 – Site Contractor testing.

($_____)

1.02 TIME OF COMPLETION

A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, he will start work on _____ 2023. Substantial completion will be _____2023. The punch list work will be completed by _____ 2023 and performed after school hours.

1.03 BID SECURITY

A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality and function.

Unit price No. 01 – Removal of rock per cy (athletic field/site work/utilities).

($_____CY_)

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not submit a bid for the purpose of restricting competition.

Resolved that _____
(Name of Individual)
be authorized to sign and submit the bid or proposal of this corporation for the following project _____and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by
_____
Corporation at a meeting of its Board of Directors held on the
_____day of_____, 20_____.

(SEAL OF THE CORPORATION)

_____
Secretary

1.07 ACCEPTANCE

A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

A. The undersigned hereby represents that it is a_____
(Corporation, Partnership, or an Individual). If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under laws of New York State and it is authorized to do business in this State.

1.10 PLACE OF BUSINESS

A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed or delivered.

_____
(Name)

_____
(Address)

_____
(Telephone)

1.11 EXECUTION OF CONTRACT

A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.12 ADDENDA

A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal

has been received and shall fill in the addenda number and date.

Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____
Addendum #_____	Dated_____

1.13 ASBESTOS

A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated_____, 20_____ _____

Legal Name of Person, Partnership or Corporation

By _____

Title _____

Address _____

_____

_____

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
Sample

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Init.
/

Signed and sealed this day of ,

(Contractor as Principal)	*(Seal)*
(Witness)	*(Title)*
(Surety)	*(Seal)*
(Witness)	*(Title)*

SECTION 003126 – EXISTING HAZARDOUS MATERIAL INFORMATION

PART 1 - GENERAL

1.1 SUMMARY

A. The following information in this section is provided for informational purposes only and shall not become part of the contract documents.

1. Pre-Construction Survey Report 11/4/22

QuES&T
Quality Environmental Solutions & Technologies, Inc.

PRE-CONSTRUCTION SURVEY REPORT
FOR
ASBESTOS-CONTAINING MATERIALS (ACM)
LEAD-BASED PAINTS (LBP)
POLYCHLORINATD BIPHENYL (PCB)

Prepared for:

NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

at

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

November 4, 2022

QuES&T Project #22-5004

1376 Route 9, Wappingers Falls, NY 12590 Phone (845) 298-6031 Fax (845) 298-6251
NYS MWBD MBE Cert # 49952-2006 NYSUCP DBE Certified NJUCP DBE Certified www.Qualityenv.com

QuES&T

Quality Environmental Solutions & Technologies, Inc.

November 4, 2022

North Rockland CSD
65 Chapel Street
Garnerville, NY 10923

ATTN: Paul Rooney

Via E-mail: prooney@nrcsd.org

Re: North Rockland CSD
North Rockland High School Projects – Phase 1
Pre-Construction Asbestos, Lead, PCB
QuES&T Project #22-5004

Dear Mr. Rooney,

Attached is the Pre-Construction Inspection Report for Asbestos-containing Materials (ACM), Lead-Based Paints (LBP), Polychlorinated Biphenyls (PCB) identified throughout areas included within the above-referenced location(s) by **Qu**ality **E**nvironmental **S**olutions **& T**echnologies, Inc. **(QuES&T)**. The inspection included visual assessment of the location in question, and representative sampling, as required, in compliance with the requirements of all applicable federal, state, and local regulations.

The attached report summarizes the inspection protocol and inspection results for your review. **QuES&T** believes this report accurately reflects the material condition existing in the functional spaces at the time of our inspection.

Should you wish to discuss this matter further or require additional information concerning this submittal, please contact us at (845) 298-6031. **QuES&T** appreciates the opportunity to assist North Rockland CSD in the environmental services area.

Sincerely,

Nicholas Salerno
Field & Technical Services
NYS/AHERA Inspector/Project Monitor
Cert. #AH 16-10991
NYS Mold Assessor
Cert# MA01571
US EPA Certified Lead Inspector
Cert# LBP-I-I210690-1
Niton-Certified XRF Technician

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EXECUTIVE SUMMARY

Quality **E**nvironmental **S**olutions & **T**echnologies, Inc. (**QuES&T**) was retained by North Rockland CSD to conduct a Pre-Construction Survey for the presence of Asbestos-containing Materials (ACM), Lead-based Paints (LBP), Polychlorinated Biphenyls (PCB) in support of the North Rockland High School Projects – Phase 1, located at 106 Hammond Road, Thiells, NY 10984.

The survey included a visual inspection/assessment for suspect hazardous material(s), as detailed above, which are likely to be affected by planned demolition/renovations/construction activities. Inspection and sampling were limited to areas/materials slated for demolition/renovation/construction, as detailed in drawings.

The survey was conducted by **QuES&T** personnel on October 18th, 2022. Asbestos, Lead & PCB inspections and/or sampling was conducted by NYSDOL Asbestos Inspector(s) Nicholas Salerno (AH# 16-10991), Shawn Conklin (AH# 22-05119) and Jonathan Mages (AH# 18-53364) The lead survey was conducted Niton-Certified XRF Technician Nicholas Salerno utilizing X-Ray Fluorescence Technology (XRF).

ASBESTOS

Laboratory analysis and/or existing sampling data indicated the following materials as Asbestos-containing Materials (greater than 1% asbestos) **(Refer to Table I & Appendix A for details and locations)**

Field House

- Men's Bathroom, Walls & Ceiling – Cementitious Panels
- Men's Bathroom, Window – Glazing
- Women's Bathroom, Walls & Ceiling – Cementitious Panels
- Women's Bathroom, Window – Glazing

Weight Room

- Walls & Ceiling – Joint Compound
- East Side Storage Room, on Metal Duct – Pin Mastic
- Weight Room Office, Floor – Floor Tile

LEAD

Based on review of the data generated by the Niton XLp-300A XRF Spectrum Analyzer, the following surfaces within the scope of work were identified as lead-based as defined by HUD/EPA (equal to or in excess of 1.0 milligram per square centimeter) (**Refer to Table II & Appendix B for details**):

Weight Room

- Weight Room Office, Wall, Beige – Cove Base Molding
- East Weight Room Storage – Exterior Door Lintel
- Weight Room Shower Storage, Wall – Ceramic Wall Base
- Weight Room Center Storage, Wall – Ceramic Wall Base
- Weight Room Office Bathroom, Wall – Ceramic Wall Base
- Former Locker Room (Current Training Room), Wall – Support Beam

It should be noted that several components tested did in fact contain minimal lead-levels below the EPA threshold level of 1.0 mg/sq. cm for classification as Lead-Based Paint (LBP) and are considered lead-containing coatings by the OSHA Regulation, "Lead Exposure in Construction" (29 CFR 1926.62). OSHA does not recognize a minimum limit for lead concentrations in paint for the purposes of

disturbance. Monitoring of workers performing demolition/cleaning/disturbance of painted surfaces shall be completed to document personnel occupational exposure. Items containing any amount of lead concentration are considered lead-containing coatings per 29 CFR 1926.62, OSHA Lead Exposure in Construction.

PCB

- Materials are considered to be hazardous if they contain greater than fifty (50) parts per million (ppm) of PCBs based on a sum of all Arocolors. Laboratory analysis indicates that the following materials are hazardous based on PCB concentrations of greater than 50 ppm.

  No Samples Taken

1.0 INTRODUCTION:

Quality **E**nvironmental **S**olutions **& T**echnologies, Inc. **(QuES&T)** performed a Pre-Construction Survey for the presence of Asbestos-containing Materials (ACM), Lead-based Paint (LBP) and Polychlorinated Biphenyls (PCB) in conformance with the requirements of all applicable federal, state, and local regulations. The survey included a visual inspection/assessment, and representative sampling of suspect hazardous materials, as required, throughout accessible interior and exterior locations to be affected by future renovations at North Rockland High School, located at 106 Hammond Road, Thiells, NY 10984.

Certified **QuES&T** personnel, Nicholas Salerno, Jonathan Mages & Shawn Conklin conducted field inspection(s) on October 18th, 2022. The inspection scope was established based on review of work scope drawings. Results and findings from previous surveys conducted by **QuES&T** were utilized in this inspection.

QuES&T established functional spaces based either on physical barriers (i.e. walls, doors, etc.) or homogeneity of material. Within each functional space identified, a visual inspection was performed using reasonable care and judgment, to identify and assess location, quantity, friability, and/or condition, as applicable, of all accessible installed building materials observed at the affected portion of the building/structure.

Limited localized demolition of building surfaces was performed, as part of this survey, to access concealed surfaces. No disassembly of installed equipment was conducted as part of this inspection. ACM, LBP and/or PCB's, concealed within structural components and equipment interiors or that is accessible only through extensive mechanical or structural demolition may not have been identified as part of this survey.

Homogenous material types were established based on appearance, color and texture. The findings presented in this report are based upon reasonably available information and observed site conditions at the time the assessment was performed. The findings and conclusions of this report are not meant to be indicative of future conditions at the site and does not warrant against conditions that were not evident from visual observations or historical information obtained from others.

2.0 ASBESTOS SURVEY:

2.1 INSPECTION SUMMARY

QuES&T performed a Pre-Construction Survey, in conformance with Title 12 NYCRR Part 56-5.1, for North Rockland CSD in support of the Construction Project at North Rockland High School, located at 106 Hammond Road, Thiells, NY 10984. The survey included a visual inspection / assessment for

Presumed Asbestos-containing Materials (PACM) and suspect miscellaneous Asbestos-containing Materials (ACM) throughout accessible interior and exterior locations to be affected by future renovations, as detailed above. Results and findings from previous inspections conducted by **QuES&T** were utilized in this inspection.

Limited localized demolition of building surfaces was performed, as part of this survey, to access concealed surfaces. No disassembly of installed equipment was conducted as part of this inspection. ACM concealed within structural components and equipment interiors or that is accessible only through extensive mechanical or structural demolition may not have been identified as part of this survey. When any construction activity, such as demolition, remodeling, renovation or repair work, reveals PACM or suspect miscellaneous ACM that has not been identified, as part of this survey, all construction activities shall cease in the affected area.

The survey included both visual inspection of accessible spaces and representative sampling of suspect building materials for ACM. Samples collected were analyzed by a laboratory approved under the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP). Samples were analyzed in the laboratory by Polarized Light Microscopy (PLM), Polarized Light Microscopy-NOB (PLM-NOB) and/or Quantitative Transmission Electron Microscopy (QTEM), as required. Sample collection and laboratory analysis were conducted in compliance with the requirements of Title 12 NYCRR Part 56-5.1, 29 CFR 1926.1101 and standard EPA & OSHA accepted methods. Samples consisting of multiple layers were separated and analyzed independently in the laboratory.

2.2 SAMPLE COLLECTION & ANALYTIAL PROCEDURES

Representative bulk sampling was performed on suspect building materials for laboratory analysis using PLM, PLM-NOB, and/or QTEM. The following is a summary of installed building materials sampled:

- Wall Materials – Concrete Block, Mortar, Brick, Cove Base Molding, Adhesive, Joint Compound, Joint Tape, Sheetrock, Cementitious Panel, Mastic, Ceramic Tile.
- Ceiling Materials – Joint Compound, Joint Tape, Sheetrock, Cementitious Panel, Ceiling Tile, Plaster.
- Flooring Materials – Concrete Slab, Flooring, Epoxy, Floor Tile, Mastic, Ceramic Tile, Mortar, Setting Bed, Vapor Barrier.
- Thermal System Insulation Materials (TSI) – Mudded Joint Packing, Pipe Insulation.
- Roofing Materials – EPDM, Mastic, Asphalt Shingle, Vapor Barrier, Concrete.
- Miscellaneous Materials – Anti-Sweat Tar, Glazing, Caulk, Pin Mastic

Certified **QuES&T** personnel (Appendix C), Mr. Nicholas Salerno (Cert. #AH 16-10991), Mr. Shawn Conklin (AH#22-05119), and Mr. Jonathan Mages (Cert. #AH 18-53364)) performed visual assessments throughout interior and exterior construction areas. A total of one-hundred thirty-seven **(137)** samples/layers of installed and accessible suspect building materials were analyzed by a laboratory approved under the NYSDOH ELAP. Fifty-nine **(59)** samples/layers were analyzed using Polarized Light Microscopy (PLM) for friable materials; forty-four **(44)** samples/layers were analyzed using Polarized Light Microscopy (PLM-NOB) for non-friable organically bound materials; and thirty-four **(34)**

samples/layers were analyzed by Confirmatory-QTEM following negative-determinations using PLM-NOB protocols.

2.3 IDENTIFIED ASBESTOS-CONTAINING MATERIALS (ACM)

TABLE I: IDENTIFIED ACM
NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984
(CONSTRUCTION AREAS)
(Refer to Appendix A for details)

KEY: **ACM** = Materials containing greater than 1% of asbestos;
LF = Linear Feet; **SF** = Square Feet; **PACM** = Presumed Asbestos-containing Materials;
Friable = ACM capable of being released into air, and which can be crumbled, pulverized, powdered, crushed or exposed by hand-pressure.

Location	Material	Approximate Quantity	Friable?	Condition
PRESS BOX				
***** No Asbestos-Containing Materials (ACM) Detected *****				
FIELD HOUSE				
Men's Bathroom, Walls & Ceiling	Cementitious Panel	300 SF	Yes	Good
Men's Bathroom, Window, Interior	Glazing	15 SF	Yes	Good
Women's Bathroom, Walls & Ceiling	Cementitious Panel	300 SF	Yes	Good
Women's Bathroom, Window, Interior	Glazing	30 LF	No	Good
Athletic Storage, Walls, on Sheetrock	Cementitious Panels	75 SF	Yes	Good
HIGH SCHOOL				
Weight Room Area, Ceilings, Throughout, on Sheetrock	Joint Compound & Contaminated Sheetrock	3,336 SF	Yes	Good
Weight Room Office, Floor, on Slab	Floor Tile	168 SF	No	Good
East Side Storage Room, on Metal HVAC Duct	Pin Mastic	30 SF	No	Good
Training Room Office, Floor[1]	Floor Tile	150 SF	No	Good

NOTE:
1. Training Room Office is shown as being out of scope on the demolition drawings provided. Information of ACM present in this area is given to avoid potential unintentional disturbance of the material(s) during proposed demolition.

3.0 LEAD SURVEY:

3.1 INSPECTION SUMMARY

QuES&T conducted a Limited Pre-Construction Lead Survey, utilizing X-Ray Fluorescence Technology (XRF), throughout specific interior and exterior areas of North Rockland High School, located at 106 Hammond Road, Thiells, NY 10984 in support of the North Rockland CSD Construction Project. The survey was limited to specific accessible, representative building components & immovable objects, potentially affected by scheduled renovation/construction activities. Niton-certified XRF Technician(s) Nicholas Salerno of **QuES&T**, collected a total of seventy-three **(73)** samples (including calibrations) on October 18th, 2022.

3.2 IDENTIFIED LEAD-BASED PAINT(S) (LBP)

Based on review of the data generated by the Niton XLp-300A XRF Spectrum Analyzer, the following surfaces tested were identified as lead-based as defined by HUD/EPA (equal to or in excess of 1.0 milligram per square centimeter):

TABLE II: IDENTIFIED LEAD-BASED PAINT
NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984
(CONSTRUCTION AREAS)

Location	LBP Component	Substrate	Color	LBP Condition	Approximate Quantity
PRESS BOX					
***** No Lead-Based Paints/Coatings (LBP) Detected Within Scope of Work *****					
FIELD HOUSE					
***** No Lead-Based Paints/Coatings (LBP) Detected Within Scope of Work *****					
HIGH SCHOOL					
Weight Room Office, Wall, 4”	Cove Base Molding	Vinyl	Beige	Fair	45 LF
Weight Room Office Bathroom, Wall	Wall Base	Ceramic	Beige	Fair	25 LF
Weight Room Shower Storage, Wall	Wall Base	Ceramic	Beige	Fair	80 LF
East Weight Room Storage, Exterior Door	Lintel	Metal	Brown	Fair	5 LF
Weight Room Storage Area, Wall	Wall Base	Ceramic	Beige	Fair	70 LF
Trainer’s Room (Former Locker Room), Wall	Support Beam	Metal	White	Fair	80 SF
Trainer’s Office, Wall[2]	Cove Base Molding	Vinyl	Beige	Fair	55 LF
Trainer’s Office Bathroom, Wall[2]	Wall Base	Ceramic	Beige	Fair	25 LF

NOTE:
1. Locations and quantities of identified LBPs are limited to areas potentially affected by future renovation activities. Surfaces/components with LBP’s may exist in other spaces not included in this scope of work.
2. Training Room Office is shown as being out of scope on the demolition drawings provided. Information of LBP present in this area is given to avoid potential unintentional disturbance of the material(s) during proposed demolition.

It should be noted that several components tested did in fact contain minimal lead-levels below the EPA threshold level of 1.0 mg/sq. cm for classification as Lead-Based Paint (LBP) and are considered lead-containing coatings by the OSHA Regulation, "Lead Exposure in Construction" (29 CFR 1926.62). OSHA does not recognize a minimum limit for lead concentrations in paint for the purposes of disturbance. Monitoring of workers performing demolition/cleaning/disturbance of painted surfaces shall be completed to document personnel occupational exposure. Items containing any amount of lead concentration are considered lead-containing coatings per 29 CFR 1926.62, OSHA Lead Exposure in Construction.

4.0 POLYCHLORINATED BIPHENYL (PCB) SURVEY:

4.1 INSPECTION SUMMARY

QuES&T conducted a Limited Pre-Construction Survey for the presence of PCBs in support of the North Rockland CSD Construction Project at North Rockland High School located at 106 Hammond Road, Thiells, NY 10984. Sampling was limited to representative, homogenous, exterior caulks potentially affected by renovations as detailed in work scope drawings.

Nicholas Salerno, Jonathan Mages & Shawn Conklin of **QuES&T**, collected a total of zero **(0)** bulk samples on October 18th, 2022. Bulk samples were properly packaged and forwarded to York Analytical Laboratories, Inc., in Stratford, CT for analysis using method SW846-8082A. Copies of the analytical results are contained within attached appendices for review.

4.2 IDENTIFIED PCBS

A summation of samples collected, and associated results are as follows:

TABLE III: SUMMATION OF COLLECTED PCB CAULK SAMPLES
NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984
(CONSTRUCTION AREAS)

Sample #	Location/Description	Material Matrix	Color	Substrate	Applicable Regulatory Standards (Most Stringent)	Classification Result Upon Lab analysis
***** No Samples Taken Within Scope of Work *****						

5.0 RECOMMENDATIONS:

5.1 ASBESTOS

All construction personnel as well as individuals who have access to locations where asbestos containing materials (ACM) exists should be informed of its presence and the proper work practices in these areas. Conspicuous labeling of all ACM is suggested to ensure personnel is adequately informed. Personnel should be informed not to rest, lean or store material or equipment on or near these surfaces and not to cut, saw, drill, sand or disturb ACM. All removal, disturbance, and repair of ACM should be performed in

compliance with Title 12 NYCRR Part 56 by persons properly trained to handle ACM. Facility custodial and maintenance personnel should receive training commensurate with their work activities; as defined in 29 CFR 1910.1001.

As specified in Title 12 NYCRR Part 56-5.1 (h) and (i), "If the building/structure asbestos survey finds that the portion of the building/structure to be demolished, renovated, remodeled, or have repair work contains ACM, PACM, suspect miscellaneous ACM assumed to be ACM, or asbestos material, which is impacted by the work, the owner or the owner's agent shall conduct, or cause to have conducted, asbestos removal performed by a licensed asbestos abatement contractor in conformance with all standards set forth in this Part. All ACM, PACM, suspect miscellaneous ACM assumed to be ACM, or asbestos material impacted by the demolition, renovation, remodeling or repair project shall be removed as per this Part, prior to access or disturbance by other uncertified trades or personnel. No demolition, renovation, remodeling or repair work shall be commenced by any owner or the owner's agent prior to the completion of the asbestos abatement in accordance with the notification requirements of this Part…All building/structure owners and asbestos abatement contractors on a demolition, renovation, remodeling, or repair project, which includes work covered by this part, shall inform all trades on the work site about PACM, ACM, asbestos material and suspect miscellaneous ACM…Bids may be advertised and contracts awarded for demolition, remodeling, renovation, or repair work, but no work on the current intermediate portion of the project shall commence on the demolition, renovation, remodeling or repair work by any owner or agent prior to completion of all necessary asbestos abatement work for the current intermediate portion of the entire project, in conformance with all standards set forth in this Part."

Prior to conducting demolition or construction work at the building, all ACM affected/impacted by such activities shall be removed utilizing a licensed asbestos abatement contractor and NYSDOL/EPA/NYC certified personnel prior to construction/demolition activities. All work conducted should be in accordance with all legal requirements, including but not limited to U.S. Environmental Protection Agency (EPA) National Emissions Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], New York State Industrial Code Rule 56 Asbestos Regulations (ICR 56) and Chapter 1 of Title 15 of the Rules of the City of New York Regulations, as applicable. Advance notification of the asbestos project to the USEPA, NYSDOL, and NYCDEP may be required.

All suspect building materials not sampled during this survey should be considered ACM until these materials are sampled and analyzed for ACM in the laboratory. Concealed ACM: In addition to the ACMs identified at the site, there is a possibility that concealed ACM may exist at the subject facility. As such, if any concealed suspect ACM is encountered during future construction related activities, the work should immediately stop. Prior to resuming the work, the suspect ACM should either be 1) Sampled by an appropriately certified asbestos professional and submitted to an Approved NYSDOH ELAP laboratory for asbestos analysis or 2) Presumed to be ACM (PACM) and removed by a licensed asbestos abatement contractor for disposal in accordance with all applicable regulations.

5.2 LEAD

In addition to any identified Lead-based Paints (LBP), several components tested did in fact contain minimal lead-levels below the EPA threshold level of 1.0 mg/sq. cm for classification as LBP and are considered lead-containing coatings by the OSHA Regulation, "Lead Exposure in Construction" (29 CFR 1926.62). OSHA does not recognize a minimum limit for lead concentrations in paint for the purposes of disturbance. Monitoring of workers performing demolition/cleaning/disturbance of painted surfaces shall be completed to document personnel occupational exposure. Items containing any amount of lead concentration are considered lead-containing coatings per 29 CFR 1926.62, OSHA Lead Exposure in Construction.

Activities involving the disturbance of LBP in homes, child-occupied facilities, and/or pre-schools built before 1978 must follow the requirements outlined by EPA regulations (40 CFR 745).

In areas where demolition and/or renovations are to occur and lead is present, the demolition debris waste stream should be further analyzed during segregation for compliance with EPA regulations to ensure proper disposal. TCLP testing can be performed prior to waste segregation, but results may not be indicative of the actual waste streams produced during demolition.

5.3 PCB CAULK

Materials are considered to be hazardous if they contain greater than fifty (50) parts per million (ppm) PCBs based on the sum of all Aroclors. All materials containing greater than 50 ppm PCBs potentially impacted by proposed renovations should be abated in accordance with any applicable federal, state, and/or local codes, rules, and regulations.

6.0 DISCLAIMERS

The findings presented in this report are based upon reasonably available information and observed site conditions at the time the assessment was performed. Conditions may have changed since that time and the findings and conclusions of this report are not meant to be indicative of future conditions at the Site. This report does not warrant against conditions that were not evident from visual observations or historical information obtained, or conditions that could only be determined by physical sampling or other intrusive investigation techniques that are outside the proposed scope of work.

It should be noted that the information contained within this report is based solely upon site observations and the results of laboratory analysis for samples collected by **QuES&T.** These observations and results are time dependent, subject to changing site conditions and revisions to Federal, State and Local regulations. **QuES&T** warrants that these findings have been promulgated after being prepared in general accordance with generally accepted practices in the abatement industries. **QuES&T** also recognizes that inspection laboratory data is not usually sufficient to make all abatement and management decisions.

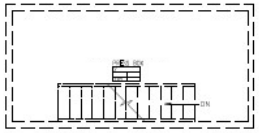
Due to the potential for concealed Asbestos-containing Materials (ACM) or other regulated materials, this report should not be construed to represent all ACM or regulated materials within the site(s). All quantities of ACM or other regulated materials identified, and all dimensions listed within this report are approximate and should be verified On-site.

This inspection report is not intended to be used as the sole basis for soliciting pricing for regulated materials abatement. An abatement plan, specification, drawing and/or Variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project. The Linear and/or Square Footages (LF / SF) listed within this Report are only approximates. Abatement Contractor(s) are required to visit the building(s) in order to take actual field measurements within each listed location.

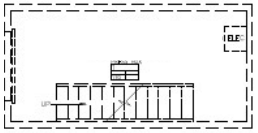
Appendix A:
ACM LOCATION DRAWINGS & PICTURES

ABOVE: FIELD HOUSE – ACM CEMENTITIOUS PANELS
BELOW: FIELD HOUSE – ACM WINDOW GLAZING

ABOVE: WEIGHT ROOM – ACM PIN MASTIC



PRESS BOX SECOND FLOOR



PRESS BOX FIRST FLOOR

No Asbestos-containing Materials (ACM) identified uponPLM & QTEM/PLM analysis

N

Drawing Not to Scale
This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

Quality Environmental Solutions & Technologies, Inc.
1376 Route 9
Wappingers Falls, NY 12590
Phone: (845) 298- 6031
Fax: (845) 298-6251

CLIENT

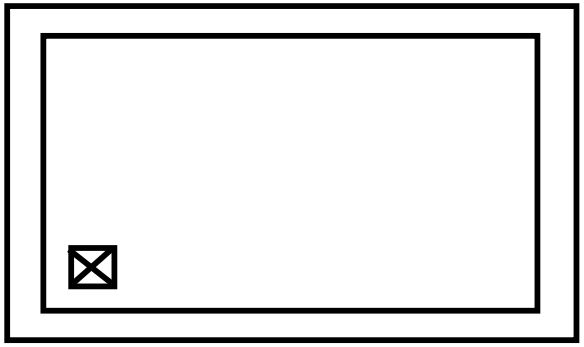
NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

FIRST & SECOND FLOORS ASBESTOS LOCATIONS

ASB-01



No Asbestos-containing Materials (ACM) identified uponPLM & QTEM/PLM analysis

N

Drawing Not to Scale
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Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

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CLIENT

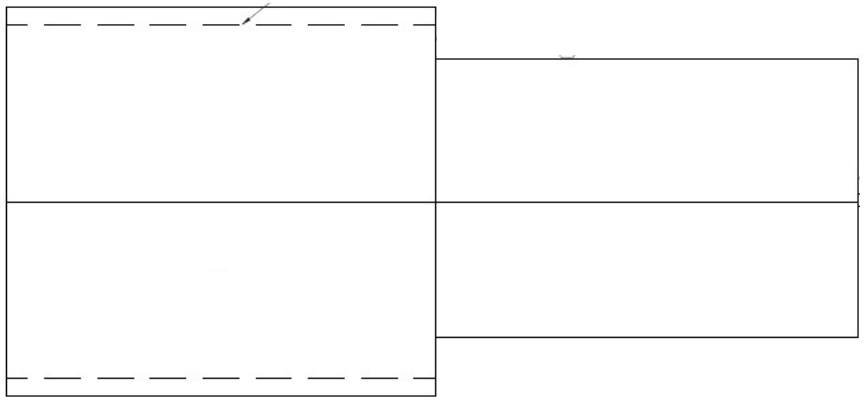
NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

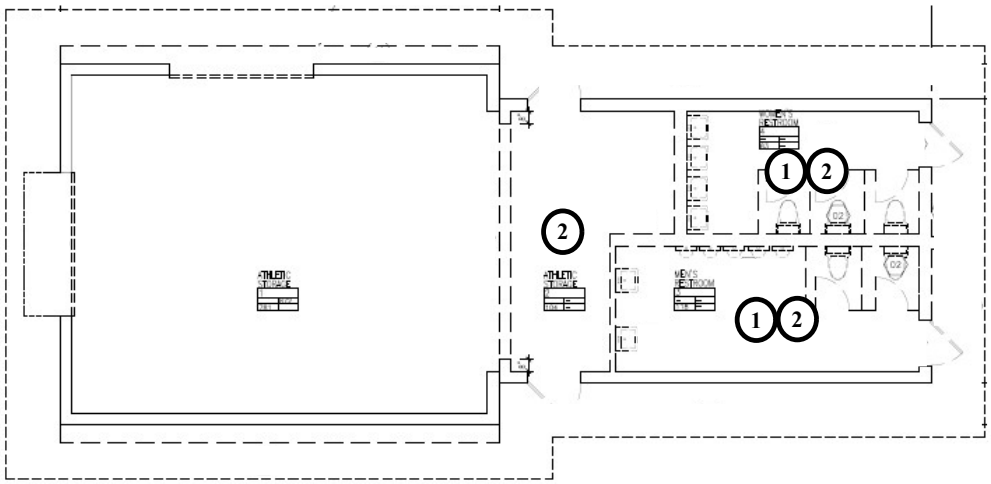
NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

PRESS BOX
ROOF
ASBESTOS LOCATIONS

ASB-02



FIELDHOUSE ROOF



FIELDHOUSE

ACM LOCATION KEY (Refer to Report for Details)	
1	ACM Window Glazing
2	ACM Cementitious Wall & Ceiling Panels

N

Drawing Not to Scale

This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

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CLIENT

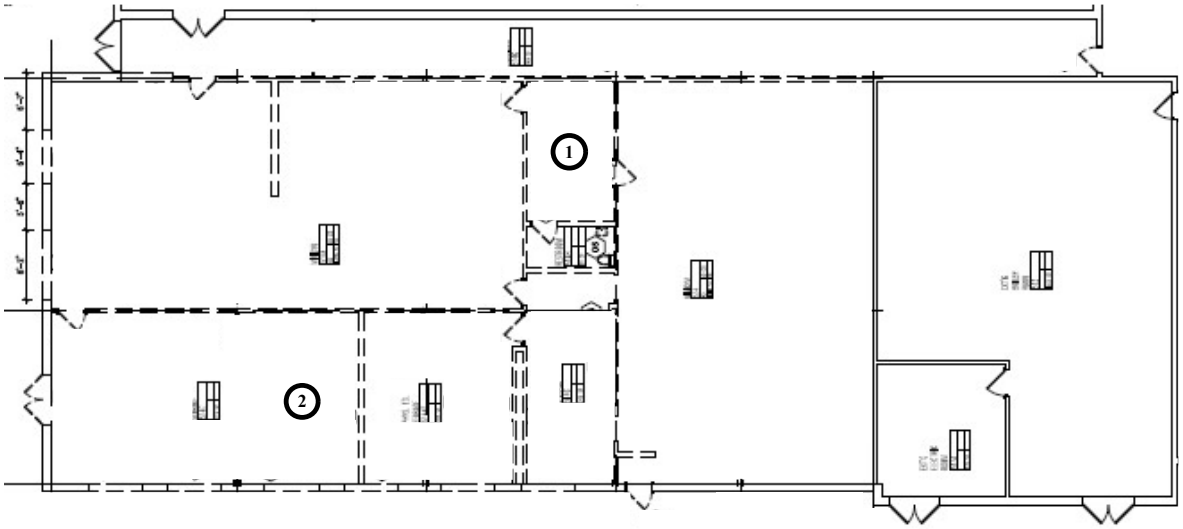
NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

FIELD HOUSE INTERIOR/EXTERIOR ASBESTOS LOCATIONS

ASB-03



ACM LOCATION KEY (Refer to Report for Details)	
NOTE	ACM Joint Compound & Contaminated Sheetrock Throughout
1	ACM Floor Tile
2	ACM Pin Mastic

N

Drawing Not to Scale
This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	Version # 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	Prepared By: NDS

QuES&T

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CLIENT

NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

WEIGHT ROOM AREA ASBESTOS LOCATIONS

ASB-04

Appendix B:
ASBESTOS SAMPLE RESULTS & SAMPLE LOCATIONS

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-01	5004-02	5004-03	5004-04
Layer Number					
Lab ID Number		2872209	2872210	2872211	2872212
Sample Location		1st Floor, Press Box, Interior, Wall	1st Floor, Press Box, Interior, Wall	1st Floor, Press Box, Exterior, Wall	1st Floor, Press Box, Exterior, Wall
Sample Description		Mortar	Block	Mortar	Block
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	No
	Homogenous	Yes	No	Yes	No
	Fibrous	No	No	No	No
	Color	Gray	Gray	Gray	Gray
Sample Treatment		None	Homogenized	None	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	30.0	55.0	20.0	50.0
	% Carbonates	50.0	25.0	40.0	30.0
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	20.0	40.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-05	5004-06	5004-07	5004-08
Layer Number					
Lab ID Number		2872213	2872214	2872215	2872216
Sample Location		1st Floor, Press Box, Wall	1st Floor, Press Box, Wall	1st Floor, Press Box, Wall	1st Floor, Press Box, Wall
Sample Description		Brick	Brick	Mortar	Mortar
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	No	No	No	No
	Color	Red	Red	Gray	Gray
Sample Treatment		Homogenized	Homogenized	None	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	25.0	25.0	30.0	30.0
	% Carbonates	ND	ND	55.0	55.0
	% Other	ND	ND	ND	ND
	% Unidentified	75.0	75.0	15.0	15.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-09	5004-10	5004-15	5004-16
Layer Number					
Lab ID Number		2872217	2872218	2872219	2872220
Sample Location		1st Floor, Press Box, Floor	1st Floor, Press Box, Floor	1st Floor, Field House, Wall, Concession Area	1st Floor, Field House, Wall, Concession Area
Sample Description		Concrete Slab	Concrete Slab	Block	Block
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	Yes	No
	Homogenous	No	No	No	No
	Fibrous	No	No	No	No
	Color	Gray	Gray	Gray/White	Gray
Sample Treatment		Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	60.0	70.0	50.0	60.0
	% Carbonates	20.0	10.0	30.0	20.0
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	20.0	20.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-17	5004-18	5004-19	5004-20
Layer Number					
Lab ID Number		2872221	2872222	2872223	2872224
Sample Location		1st Floor, Field House, Wall, Concession Area	1st Floor, Field House, Wall, Concession Area	1st Floor, Field House, Floor	1st Floor, Field House, Floor
Sample Description		Mortar	Mortar	Concrete Slab	Concrete Slab
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes	Yes
	Homogenous	No	No	No	No
	Fibrous	No	No	No	No
	Color	Gray/White	Gray/White	Gray/Brown	Gray/Brown
Sample Treatment		Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	25.0	20.0	65.0	65.0
	% Carbonates	50.0	55.0	5.0	5.0
	% Other	ND	ND	ND	ND
	% Unidentified	25.0	25.0	30.0	30.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-25	5004-25	5004-26	5004-26
Layer Number		1	2	1	2
Lab ID Number		2872225	2872225	2872226	2872226
Sample Location		1st Floor, Field House, On Sheetrock, Ceiling	1st Floor, Field House, On Sheetrock, Ceiling	1st Floor, Field House, On Sheetrock, Wall	1st Floor, Field House, On Sheetrock, Wall
Sample Description		Joint Compound and Tape (Compound Layer)	Joint Compound and Tape (Tape Layer)	Joint Compound and Tape (Compound Layer)	Joint Compound and Tape (Tape Layer)
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	No	Yes	No
	Homogenous	No	Yes	No	Yes
	Fibrous	No	Yes	No	Yes
	Color	White/Gray	Beige	White/Gray	Beige
Sample Treatment		Homogenized	None	Homogenized	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	90.0	ND	90.0
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	10.0	ND	10.0	ND
	% Carbonates	80.0	ND	80.0	ND
	% Other	ND	5.0	ND	5.0
	% Unidentified	10.0	5.0	10.0	5.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Sample ID Number		5004-27	5004-28	5004-29	5004-30
Layer Number					
Lab ID Number		2872227	2872228	2872229	2872230
Sample Location		1st Floor, Field House, On Sheetrock, Wall	1st Floor, Field House, Wall, Paint Room	1st Floor, Field House, Ceiling, Concession Area	1st Floor, Field House, Mens Bathroom, Wall
Sample Description		Joint Compound	Sheetrock	Sheetrock	Cementitious Panel
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Point Count
Appearance	Layered	Yes	Yes	Yes	Yes
	Homogenous	No	No	No	No
	Fibrous	No	Yes	Yes	Yes
	Color	White/Gray	Gray/Brown	Gray/Brown	Gray/Brown
Sample Treatment		Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	7.0
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	7.0
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	15.0	15.0	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	10.0	55.0	55.0	ND
	% Carbonates	75.0	5.0	5.0	ND
	% Other	ND	ND	ND	ND
	% Unidentified	15.0	25.0	25.0	93.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Sample ID Number		5004-31	5004-34	5004-35	5004-50
Layer Number					
Lab ID Number		2872231	2872232	2872233	2872234
Sample Location		1st Floor, Field House, Womens Bathroom, Ceiling	1st Floor, Field House, Ceiling, On Sheetrock	1st Floor, Field House, Ceiling, On Sheetrock	1st Floor, Press Box, Top of Parapet Wall, Concrete Coping Stone
Sample Description		Cementitious Panel	Joint Compound	Joint Compound	Concrete
Method of Quantification		Point Count	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes	Yes
	Homogenous	No	No	No	No
	Fibrous	Yes	No	No	No
	Color	Gray/Brown	White	White	Gray/White
Sample Treatment		Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	6.7	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	6.7	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	ND	10.0	10.0	50.0
	% Carbonates	ND	80.0	80.0	20.0
	% Other	ND	ND	ND	ND
	% Unidentified	93.3	10.0	10.0	30.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-51	5004-52	5004-53	5004-54
Layer Number					
Lab ID Number		2872235	2872236	2872237	2872238
Sample Location		1st Floor, Press Box, Top of Parapet Wall, Concrete Coping Stone	1st Floor, Weight Room, Ceramic Cove Base, On Block Wall	1st Floor, Weight Room, Ceramic Cove Base, On Block Wall	1st Floor, Weight Room, Cove Base, Mortar, On Block Wall
Sample Description		Concrete	Ceramic Wall Tile	Ceramic Wall Tile	Mortar
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes	No
	Homogenous	No	No	No	Yes
	Fibrous	No	No	No	No
	Color	Gray/White	White	White	Gray
Sample Treatment		Homogenized	Homogenized	Homogenized	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	45.0	40.0	40.0	40.0
	% Carbonates	35.0	ND	ND	40.0
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	60.0	60.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-55	5004-56	5004-57	5004-60
Layer Number					1
Lab ID Number		2872239	2872240	2872241	2872242
Sample Location		1st Floor, Weight Room, Cove Base, Mortar, On Block Wall	1st Floor, Weight Room, West Weight Room, Floor	1st Floor, Weight Room, East Weight Room, Floor	1st Floor, Weight Room, Shower, Floor, On Setting Bed
Sample Description		Mortar	Concrete Slab	Concrete Slab	Ceramic Tile and Mortar (Tile Layer)
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	No
	Homogenous	Yes	No	No	No
	Fibrous	No	No	No	No
	Color	Gray	Gray/Brown	Gray/Brown	Brown/White
Sample Treatment		None	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	35.0	65.0	50.0	5.0
	% Carbonates	45.0	25.0	35.0	20.0
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	10.0	15.0	75.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-60	5004-61	5004-61	5004-62
Layer Number		2	1	2	
Lab ID Number		2872242	2872243	2872243	2872244
Sample Location		1st Floor, Weight Room, Shower, Floor, On Setting Bed	1st Floor, Weight Room, Shower, Floor, On Setting Bed	1st Floor, Weight Room, Shower, Floor, On Setting Bed	1st Floor, Weight Room, Shower, Floor, Under Tile, On Concrete Slab
Sample Description		Ceramic Tile and Mortar (Mortar Layer)	Ceramic Tile and Mortar (Tile Layer)	Ceramic Tile and Mortar (Mortar Layer)	Setting Bed
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	No
	Homogenous	Yes	No	Yes	No
	Fibrous	No	No	No	No
	Color	Brown/Gray	Brown/White	Brown/Gray	Brown/White
Sample Treatment		None	Homogenized	None	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	25.0	10.0	25.0	35.0
	% Carbonates	60.0	20.0	60.0	45.0
	% Other	ND	ND	ND	ND
	% Unidentified	15.0	70.0	15.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-63	5004-64	5004-65	5004-66
Layer Number					
Lab ID Number		2872245	2872246	2872247	2872248
Sample Location		1st Floor, Weight Room, Shower, Floor, Under Tile, On Concrete Slab	1st Floor, Weight Room, West Weight Room, Wet Wall, On Metal Pipe	1st Floor, Weight Room, West Weight Room, Wet Wall, On Metal Pipe	1st Floor, Weight Room, West Weight Room, Wet Wall, On Metal Pipe, Fiberglass
Sample Description		Setting Bed	Mudded Joint Packing	Mudded Joint Packing	Pipe Insulation
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	Yes
	Homogenous	No	No	No	No
	Fibrous	No	Yes	Yes	Yes
	Color	Brown/White	Gray/Brown	Gray/Brown	Yellow/White/Silver
Sample Treatment		Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	20.0	20.0	60.0
	% Cellulose	ND	15.0	15.0	20.0
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	25.0	10.0	10.0	ND
	% Carbonates	55.0	40.0	40.0	ND
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	15.0	15.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-67	5004-68	5004-79	5004-79
Layer Number				1	2
Lab ID Number		2872249	2872250	2872251	2872251
Sample Location		1st Floor, Weight Room, West Weight Room, Wet Wall, On Metal Pipe, Fiberglass	1st Floor, Weight Room, East Weight Room, Gym Storage, On Metal Pipe	1st Floor, Weight Room, East Weight Room, Ceiling, On Sheetrock	1st Floor, Weight Room, East Weight Room, Ceiling, On Sheetrock
Sample Description		Pipe Insulation	Mudded Joint Packing	Joint Compound and Tape (Compound Layer)	Joint Compound and Tape (Tape Layer)
Method of Quantification		Scanning Option	Scanning Option	Point Count	Scanning Option
Appearance	Layered	Yes	No	Yes	No
	Homogenous	No	No	No	Yes
	Fibrous	Yes	Yes	Yes	Yes
	Color	Yellow/White/Silver	Gray	White	Beige
Sample Treatment		Homogenized	Homogenized	Homogenized	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	1.2	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	1.2	ND
Other Fibrous Materials Present	% Fibrous Glass	60.0	25.0	ND	ND
	% Cellulose	20.0	2.0	ND	95.0
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	ND	10.0	ND	ND
	% Carbonates	ND	48.0	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	15.0	98.8	5.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-80	5004-80	5004-81	5004-82
Layer Number		1	2		1
Lab ID Number		2872252	2872252	2872253	2872254
Sample Location		1st Floor, Weight Room, East Weight Room, Ceiling, On Sheetrock	1st Floor, Weight Room, East Weight Room, Ceiling, On Sheetrock	1st Floor, Weight Room, West Weight Room, Ceiling, On Sheetrock	1st Floor, Weight Room, Old Shower Room, Ceiling, Textured
Sample Description		Joint Compound and Tape (Compound Layer)	Joint Compound and Tape (Tape Layer)	Joint Compound	Plaster (Plaster Layer)
Method of Quantification		Point Count	Scanning Option	Point Count	Scanning Option
Appearance	Layered	Yes	No	Yes	No
	Homogenous	No	Yes	No	Yes
	Fibrous	No	Yes	Yes	No
	Color	White	Beige	White	White
Sample Treatment		Homogenized	None	Homogenized	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	1.3	ND	1.1	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	1.3	ND	1.1	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	95.0	5.3	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	ND	ND	ND	25.0
	% Carbonates	ND	ND	ND	55.0
	% Other	ND	ND	ND	ND
	% Unidentified	98.7	5.0	93.6	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-82	5004-83	5004-83	5004-84
Layer Number		2	1	2	1
Lab ID Number		2872254	2872255	2872255	2872256
Sample Location		1st Floor, Weight Room, Old Shower Room, Ceiling, Textured	1st Floor, Weight Room, Old Shower Room, Ceiling, Textured	1st Floor, Weight Room, Old Shower Room, Ceiling, Textured	1st Floor, Weight Room, Old Shower Room, Ceiling, Textured
Sample Description		Plaster (Scratch Layer)	Plaster (Plaster Layer)	Plaster (Scratch Layer)	Plaster (Plaster Layer)
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray	White	Gray	White
Sample Treatment		None	None	None	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	20.0	25.0	20.0	25.0
	% Carbonates	60.0	55.0	60.0	45.0
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	20.0	20.0	30.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-84	5004-85	5004-86	5004-87
Layer Number		2			
Lab ID Number		2872256	2872257	2872258	2872259
Sample Location		1st Floor, Weight Room, Old Shower Room, Ceiling, Textured	1st Floor, Weight Room, Shower Storage, Wall	1st Floor, Weight Room, East Weight Room, Ceiling	1st Floor, Locker Room, Main Area, Wall, On Sheetrock
Sample Description		Plaster (Scratch Layer)	Sheetrock	Sheetrock	Joint Compound
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	Yes	Yes
	Homogenous	Yes	Yes	No	No
	Fibrous	No	Yes	Yes	No
	Color	Gray	Gray	Gray/Brown	Tan/White
Sample Treatment		None	None	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	5.0	15.0	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	20.0	60.0	60.0	10.0
	% Carbonates	60.0	10.0	5.0	75.0
	% Other	ND	ND	ND	ND
	% Unidentified	20.0	25.0	20.0	15.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-88	5004-89	5004-90	5004-91
Layer Number					
Lab ID Number		2872260	2872261	2872262	2872263
Sample Location		1st Floor, Locker Room, Main Area, Wall, On Sheetrock	1st Floor, Locker Room, Main Area, Ceiling, On Sheetrock	1st Floor, Locker Room, Main Area, Ceiling	1st Floor, Locker Room, Main Area, Wall
Sample Description		Joint Compound	Joint Compound	Sheetrock	Sheetrock
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes	Yes
	Homogenous	No	No	No	No
	Fibrous	No	No	Yes	Yes
	Color	Tan/White	Tan/White	Gray/Brown	Gray/Brown
Sample Treatment		Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	5.0	2.0
	% Cellulose	ND	ND	5.0	10.0
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	10.0	10.0	60.0	58.0
	% Carbonates	80.0	80.0	10.0	5.0
	% Other	ND	ND	ND	ND
	% Unidentified	10.0	10.0	20.0	25.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-94	5004-95	5004-96	5004-96
Layer Number				1	2
Lab ID Number		2872264	2872265	2872266	2872266
Sample Location		1st Floor, Locker Room, Main Area, Under Floor Tile, Mastic, and Vapor Barrier	1st Floor, Locker Room, Training Room, Under Floor Tile and Mastic	1st Floor, Locker Room, Main Area, Wall	1st Floor, Locker Room, Main Area, Wall
Sample Description		Concrete Slab	Concrete Slab	Block and Mortar (Block Layer)	Block and Mortar (Mortar Layer)
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray/Black	Gray/Black	Beige/Black	Gray
Sample Treatment		Homogenized	Homogenized	None	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND	ND
	% Cellulose	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	70.0	60.0	10.0	35.0
	% Carbonates	20.0	30.0	65.0	45.0
	% Other	ND	ND	ND	ND
	% Unidentified	10.0	10.0	25.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Sample ID Number		5004-97	5004-97
Layer Number		1	2
Lab ID Number		2872267	2872267
Sample Location		1st Floor, Locker Room, Training Room, Wall	1st Floor, Locker Room, Training Room, Wall
Sample Description		Block and Mortar (Block Layer)	Block and Mortar (Mortar Layer)
Method of Quantification		Scanning Option	Scanning Option
Appearance	Layered	Yes	No
	Homogenous	No	Yes
	Fibrous	No	No
	Color	Beige/Black	Gray
Sample Treatment		Homogenized	None
Asbestos Content	% Amosite	ND	ND
	% Chrysotile	ND	ND
	% Other	ND	ND
	% Total Asbestos	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND
	% Cellulose	ND	ND
	% Other	ND	ND
	% Unidentified	ND	ND
Non-Fibrous Materials Present	% Silicates	10.0	30.0
	% Carbonates	65.0	50.0
	% Other	ND	ND
	% Unidentified	25.0	20.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-11	5004-11	5004-12	5004-12
Layer Number		1	2	1	2
Lab ID Number		2871624	2871624	2871625	2871625
Sample Location		2nd Floor, Press Box, Wall, On Block and Mortar	2nd Floor, Press Box, Wall, On Block and Mortar	2nd Floor, Press Box, Wall on Block	2nd Floor, Press Box, Wall on Block
Sample Description		Covebase Molding and Mastic (Molding Layer)	Covebase Molding and Mastic (Mastic Layer)	Covebase Molding and Mastic (Molding Layer)	Covebase Molding and Mastic (Mastic Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	Yes	No	Yes
	Homogenous	Yes	No	Yes	No
	Fibrous	No	No	No	No
	Color	Black	Beige/Gray/White	Black	Beige/Gray/White
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	57.3	42.9	58.5	44.1
	% Carbonates	40.3	26.7	39.1	26.8
	% Other Inorganic	2.4	30.4	2.4	29.1

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-13	5004-14	5004-21	5004-21
Layer Number				1	2
Lab ID Number		2871626	2871627	2871628	2871628
Sample Location		2nd Floor, Press Box, Floor, On Wood	2nd Floor, Press Box, Floor, On Wood	1st Floor, Field House, On Wood Cabinets, Brown	1st Floor, Field House, On Wood Cabinets, Brown
Sample Description		Flooring	Flooring	Covebase Molding and Mastic (Molding Layer)	Covebase Molding and Mastic (Mastic Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	Yes	No	Yes
	Homogenous	No	No	Yes	No
	Fibrous	No	No	No	No
	Color	Black/Beige	Black/Beige	Brown	Beige/Brown
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND	ND
Other Materials Present	% Organic	18.2	16.1	43.3	38.1
	% Carbonates	10.2	5.3	56.2	61.3
	% Other Inorganic	71.6	78.6	0.5	0.6

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-22	5004-22	5004-23	5004-24
Layer Number		1	2		
Lab ID Number		2871629	2871629	2871630	2871631
Sample Location		1st Floor, Field House, On Wood Cabinets, Brown	1st Floor, Field House, On Wood Cabinets, Brown	1st Floor, Field House, On Metal Sink	1st Floor, Field House, On Metal Sink
Sample Description		Covebase Molding and Mastic (Molding Layer)	Covebase Molding and Mastic (Mastic Layer)	Anti-Sweat Tar	Anti-Sweat Tar
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	Yes	No	No
	Homogenous	Yes	No	Yes	Yes
	Fibrous	No	No	No	No
	Color	Brown	Beige/Brown	White	White
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	42.5	38.2	29.2	29.0
	% Carbonates	57.2	61.6	35.0	39.1
	% Other Inorganic	0.3	0.2	35.8	31.9

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-32	5004-33	5004-36	5004-37
Layer Number					
Lab ID Number		2871632	2871633	2871634	2871635
Sample Location		1st Floor, Field House, Mens Bathroom, Window, Metal to Glass	1st Floor, Field House, Mens Bathroom, Window, Metal to Glass	1st Floor, Field House, Womens Bathroom, Floor, On Concrete Slab	1st Floor, Field House, Mens Bathroom, Floor, On Concrete Slab
Sample Description		Glazing	Glazing	Epoxy	Epoxy
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	Yes	Yes	Yes
	Homogenous	No	No	No	No
	Fibrous	No	No	No	No
	Color	Beige	Beige	Gray/White/Red	Gray/White/Red
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	1.4	1.4	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	1.4	1.4	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	17.9	12.6	38.8	43.8
	% Carbonates	51.7	57.3	15.1	23.9
	% Other Inorganic	29.0	28.7	46.1	32.3

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-38	5004-39	5004-40	5004-40
Layer Number				1	2
Lab ID Number		2871636	2871637	2871638	2871638
Sample Location		1st Floor, Field House, Paint Room, On Back of Paneling, On Sheetrock	1st Floor, Field House, Paint Room, On Back of Paneling, On Sheetrock	Roof, Press Box, Top Layer	Roof, Press Box, Top Layer
Sample Description		Mastic	Mastic	EDPM and Mastic (EDPM Layer)	EDPM and Mastic (Mastic Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray	Gray	Black	Tan
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	55.9	56.6	79.9	69.8
	% Carbonates	8.3	10.3	3.5	14.0
	% Other Inorganic	35.8	33.1	16.6	16.2

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-41	5004-41	5004-42	5004-43
Layer Number		1	2		
Lab ID Number		2871639	2871639	2871640	2871641
Sample Location		Roof, Press Box, Top Layer	Roof, Press Box, Top Layer	Roof, Press Box, Termination Bar	Roof, Press Box, Termination Bar
Sample Description		EDPM and Mastic (EDPM Layer)	EDPM and Mastic (Mastic Layer)	Caulk	Caulk
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Black	Tan	Gray	Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND	ND
Other Materials Present	% Organic	79.5	46.5	43.2	57.5
	% Carbonates	3.2	21.9	56.0	41.9
	% Other Inorganic	17.3	31.6	0.8	0.6

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-44	5004-45	5004-46	5004-46
Layer Number				1	2
Lab ID Number		2871642	2871643	2871644	2871644
Sample Location		Roof, Press Box, Around Beige Parapet Wall Opening	Roof, Press Box, Around Beige Parapet Wall Opening	1st Floor, Field House, Lower Roof, On Wood Deck	1st Floor, Field House, Lower Roof, On Wood Deck
Sample Description		Caulk	Caulk	Asphalt Shingle and Vapor Barrier (Shingle Layer)	Asphalt Shingle and Vapor Barrier (Vapor Barrier Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	No	Yes	No
	Homogenous	Yes	Yes	No	Yes
	Fibrous	No	No	Yes	Yes
	Color	Gray	Gray	Black/Gray	Black
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND
Other Materials Present	% Organic	39.2	42.1	22.3	95.6
	% Carbonates	58.6	56.1	33.6	3.5
	% Other Inorganic	2.2	1.8	44.1	0.9

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-47	5004-47	5004-48	5004-49
Layer Number		1	2		
Lab ID Number		2871645	2871645	2871646	2871647
Sample Location		1st Floor, Field House, Lower Roof, On Wood Deck	1st Floor, Field House, Lower Roof, On Wood Deck	1st Floor, Field House, Upper Roof, On Wood Deck	1st Floor, Field House, Upper Roof, On Wood Deck
Sample Description		Asphalt Shingle and Vapor Barrier (Shingle Layer)	Asphalt Shingle and Vapor Barrier (Vapor Barrier Layer)	Asphalt Shingle	Asphalt Shingle
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	No	Yes	Yes
	Homogenous	No	Yes	No	No
	Fibrous	Yes	Yes	Yes	Yes
	Color	Black/Gray	Black	Black/Gray	Black/Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	23.8	92.5	24.4	24.5
	% Carbonates	34.9	6.9	50.5	51.4
	% Other Inorganic	41.3	0.6	25.1	24.1

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-58	5004-58	5004-59	5004-59
Layer Number		1	2	1	2
Lab ID Number		2871648	2871648	2871649	2871649
Sample Location		1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab	1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab	1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab	1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab
Sample Description		Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)	Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray/Beige	Black	Gray/Beige	Black
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	28.3	29.7	29.9	33.6
	% Carbonates	57.1	24.8	48.0	15.9
	% Other Inorganic	14.6	45.5	22.1	50.5

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-69	5004-70	5004-71	5004-72
Layer Number					
Lab ID Number		2871650	2871651	2871652	2871653
Sample Location		1st Floor, Weight Room, Weight Room Office, Suspended Ceiling, 2 x 2, Dot Canyon	1st Floor, Weight Room, Weight Room Office, Suspended Ceiling, 2 x 2, Dot Canyon	1st Floor, Weight Room, East Weight Room, Storage, On Metal Duct	1st Floor, Weight Room, East Weight Room, Storage, On Metal Duct
Sample Description		Ceiling Tile	Ceiling Tile	Pin Mastic	Pin Mastic
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	Yes	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	Yes	Yes	No	No
	Color	Gray/White	Gray/White	Brown	Brown
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	2.5	3.3
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	2.5	3.3
Other Materials Present	% Organic	21.6	21.5	59.8	62.4
	% Carbonates	61.1	61.2	13.7	12.2
	% Other Inorganic	17.3	17.3	24.0	22.1

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-73	5004-74	5004-75	5004-76
Layer Number					
Lab ID Number		2871654	2871655	2871656	2871657
Sample Location		1st Floor, Weight Room, West Weight Room, Under Flloring, Mats	1st Floor, Weight Room, West Weight Room, Under Flloring, Mats	1st Floor, Weight Room, Interior Door Frame, Frame Metal to Block	1st Floor, Weight Room, Interior Door Frame, Frame Metal to Block
Sample Description		Adhesive	Adhesive	Caulk	Caulk
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray	Gray	Gray	Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	53.2	51.9	48.6	48.9
	% Carbonates	46.6	47.2	31.7	33.5
	% Other Inorganic	0.2	0.9	19.7	17.6

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-77	5004-78	5004-92	5004-92
Layer Number				1	2
Lab ID Number		2871658	2871659	2871660	2871660
Sample Location		1st Floor, Weight Room, Double Door, East Weight Room, Metal to Block	1st Floor, Weight Room, Double Door, East Weight Room, Metal to Block	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab
Sample Description		Caulk	Caulk	Floor Tile, Mastic, Vapor Barrier (Tile Layer)	Floor Tile, Mastic, Vapor Barrier (Mastic Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray	Gray	Gray	Black
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	53.8	52.9	22.7	83.4
	% Carbonates	38.4	36.5	75.1	3.2
	% Other Inorganic	7.8	10.6	2.2	13.4

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-92	5004-93	5004-93	5004-93
Layer Number		3	1	2	3
Lab ID Number		2871660	2871661	2871661	2871661
Sample Location		1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab
Sample Description		Floor Tile, Mastic, Vapor Barrier (Vapor Barrier Layer)	Floor Tile, Mastic, Vapor Barrier (Tile Layer)	Floor Tile, Mastic, Vapor Barrier (Mastic Layer)	Floor Tile, Mastic, Vapor Barrier (Vapor Barrier Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	No	No	Yes
	Homogenous	No	Yes	Yes	No
	Fibrous	Yes	No	No	Yes
	Color	Brown/Black	Gray	Black	Brown/Black
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	68.3	22.6	78.2	62.3
	% Carbonates	18.0	72.3	13.8	14.2
	% Other Inorganic	13.7	5.1	8.0	23.5

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-98	5004-98	5004-99	5004-99
Layer Number		1	2	1	2
Lab ID Number		2871662	2871662	2871663	2871663
Sample Location		1st Floor, Locker Room, Hallway, On Concrete Slab, 12" x 12", Beige	1st Floor, Locker Room, Hallway, On Concrete Slab, 12" x 12", Beige	1st Floor, Locker Room, Hallway to Outside, On Concrete Slab, 12" x 12", Beige	1st Floor, Locker Room, Hallway to Outside, On Concrete Slab, 12" x 12", Beige
Sample Description		Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)	Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	No	Yes	No	Yes
	Homogenous	Yes	No	Yes	No
	Fibrous	No	No	No	No
	Color	Beige	Black/Beige	Beige	Black/Beige
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	18.7	29.1	18.6	21.4
	% Carbonates	79.4	29.5	79.3	35.0
	% Other Inorganic	1.9	41.4	2.1	43.6

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/27/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-100	5004-101	5004-102	5004-103
Layer Number					
Lab ID Number		2871664	2871665	2871666	2871667
Sample Location		1st Floor, Exterior Doors, Weight Room, Door, Metal to Brick	1st Floor, Exterior Doors, Weight Room, Door, Metal to Brick	1st Floor, Exterior Weight Room, Louvre, Metal to Brick	1st Floor, Exterior Weight Room, Louvre, Metal to Brick
Sample Description		Caulk	Caulk	Caulk	Caulk
Analytical Method		NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	Yes	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray/Black	Gray/Black	Gray	Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	49.6	46.2	54.6	52.8
	% Carbonates	39.1	38.8	41.4	39.2
	% Other Inorganic	11.3	15.0	4.0	8.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-11	5004-11	5004-12	5004-12
Layer Number		1	2	1	2
Lab ID Number		2871624	2871624	2871625	2871625
Sample Location		2nd Floor, Press Box, Wall, On Block and Mortar	2nd Floor, Press Box, Wall, On Block and Mortar	2nd Floor, Press Box, Wall on Block	2nd Floor, Press Box, Wall on Block
Sample Description		Covebase Molding and Mastic (Molding Layer)	Covebase Molding and Mastic (Mastic Layer)	Covebase Molding and Mastic (Molding Layer)	Covebase Molding and Mastic (Mastic Layer)
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	Yes	No	Yes
	Homogenous	Yes	No	Yes	No
	Fibrous	No	No	No	No
	Color	Black	Beige/Gray/White	Black	Beige/Gray/White
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	57.3	42.9	58.5	44.1
	% Carbonates	40.3	26.7	39.1	26.8
	% Other Inorganic	2.4	30.4	2.4	29.1

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-13	5004-14	5004-23	5004-24
Layer Number					
Lab ID Number		2871626	2871627	2871630	2871631
Sample Location		2nd Floor, Press Box, Floor, On Wood	2nd Floor, Press Box, Floor, On Wood	1st Floor, Field House, On Metal Sink	1st Floor, Field House, On Metal Sink
Sample Description		Flooring	Flooring	Anti-Sweat Tar	Anti-Sweat Tar
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	Yes	Yes	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	No	No	No	No
	Color	Black/Beige	Black/Beige	White	White
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	18.2	16.1	29.2	29.0
	% Carbonates	10.2	5.3	35.0	39.1
	% Other Inorganic	71.6	78.6	35.8	31.9

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-36	5004-37	5004-38	5004-39
Layer Number					
Lab ID Number		2871634	2871635	2871636	2871637
Sample Location		1st Floor, Field House, Womens Bathroom, Floor, On Concrete Slab	1st Floor, Field House, Mens Bathroom, Floor, On Concrete Slab	1st Floor, Field House, Paint Room, On Back of Paneling, On Sheetrock	1st Floor, Field House, Paint Room, On Back of Paneling, On Sheetrock
Sample Description		Epoxy	Epoxy	Mastic	Mastic
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	Yes	Yes	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray/White/Red	Gray/White/Red	Gray	Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	38.8	43.8	55.9	56.6
	% Carbonates	15.1	23.9	8.3	10.3
	% Other Inorganic	46.1	32.3	35.8	33.1

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-40	5004-40	5004-41	5004-41
Layer Number		1	2	1	2
Lab ID Number		2871638	2871638	2871639	2871639
Sample Location		Roof, Press Box, Top Layer	Roof, Press Box, Top Layer	Roof, Press Box, Top Layer	Roof, Press Box, Top Layer
Sample Description		EDPM and Mastic (EDPM Layer)	EDPM and Mastic (Mastic Layer)	EDPM and Mastic (EDPM Layer)	EDPM and Mastic (Mastic Layer)
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Black	Tan	Black	Tan
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	79.9	69.8	79.5	46.5
	% Carbonates	3.5	14.0	3.2	21.9
	% Other Inorganic	16.6	16.2	17.3	31.6

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-44	5004-45	5004-46	5004-47
Layer Number				1	1
Lab ID Number		2871642	2871643	2871644	2871645
Sample Location		Roof, Press Box, Around Beige Parapet Wall Opening	Roof, Press Box, Around Beige Parapet Wall Opening	1st Floor, Field House, Lower Roof, On Wood Deck	1st Floor, Field House, Lower Roof, On Wood Deck
Sample Description		Caulk	Caulk	Asphalt Shingle and Vapor Barrier (Shingle Layer)	Asphalt Shingle and Vapor Barrier (Shingle Layer)
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	No	Yes	Yes
	Homogenous	Yes	Yes	No	No
	Fibrous	No	No	Yes	Yes
	Color	Gray	Gray	Black/Gray	Black/Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	39.2	42.1	22.3	23.8
	% Carbonates	58.6	56.1	33.6	34.9
	% Other Inorganic	2.2	1.8	44.1	41.3

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-48	5004-49	5004-58	5004-58
Layer Number				1	2
Lab ID Number		2871646	2871647	2871648	2871648
Sample Location		1st Floor, Field House, Upper Roof, On Wood Deck	1st Floor, Field House, Upper Roof, On Wood Deck	1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab	1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab
Sample Description		Asphalt Shingle	Asphalt Shingle	Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	Yes	Yes	No	No
	Homogenous	No	No	Yes	Yes
	Fibrous	Yes	Yes	No	No
	Color	Black/Gray	Black/Gray	Gray/Beige	Black
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	8.0	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	8.0	ND
Other Materials Present	% Organic	24.4	24.5	28.3	29.7
	% Carbonates	50.5	51.4	57.1	24.8
	% Other Inorganic	25.1	24.1	6.6	45.5

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-59	5004-59	5004-69	5004-70
Layer Number		1	2		
Lab ID Number		2871649	2871649	2871650	2871651
Sample Location		1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab	1st Floor, Weight Room, Weight Room Office, Floor, On Concrete Slab	1st Floor, Weight Room, Weight Room Office, Suspended Ceiling, 2 x 2, Dot Canyon	1st Floor, Weight Room, Weight Room Office, Suspended Ceiling, 2 x 2, Dot Canyon
Sample Description		Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)	Ceiling Tile	Ceiling Tile
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	No	Yes	Yes
	Homogenous	Yes	Yes	No	No
	Fibrous	No	No	Yes	Yes
	Color	Gray/Beige	Black	Gray/White	Gray/White
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	13.2	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	13.2	ND	ND	ND
Other Materials Present	% Organic	29.9	33.6	21.6	21.5
	% Carbonates	48.0	15.9	61.1	61.2
	% Other Inorganic	8.9	50.5	17.3	17.3

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-75	5004-76	5004-77	5004-78
Layer Number					
Lab ID Number		2871656	2871657	2871658	2871659
Sample Location		1st Floor, Weight Room, Interior Door Frame, Frame Metal to Block	1st Floor, Weight Room, Interior Door Frame, Frame Metal to Block	1st Floor, Weight Room, Double Door, East Weight Room, Metal to Block	1st Floor, Weight Room, Double Door, East Weight Room, Metal to Block
Sample Description		Caulk	Caulk	Caulk	Caulk
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	No	No	No
	Homogenous	Yes	Yes	Yes	Yes
	Fibrous	No	No	No	No
	Color	Gray	Gray	Gray	Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	48.6	48.9	53.8	52.9
	% Carbonates	31.7	33.5	38.4	36.5
	% Other Inorganic	19.7	17.6	7.8	10.6

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-92	5004-92	5004-92	5004-93
Layer Number		1	2	3	1
Lab ID Number		2871660	2871660	2871660	2871661
Sample Location		1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab
Sample Description		Floor Tile, Mastic, Vapor Barrier (Tile Layer)	Floor Tile, Mastic, Vapor Barrier (Mastic Layer)	Floor Tile, Mastic, Vapor Barrier (Vapor Barrier Layer)	Floor Tile, Mastic, Vapor Barrier (Tile Layer)
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	No	Yes	No
	Homogenous	Yes	Yes	No	Yes
	Fibrous	No	No	Yes	No
	Color	Gray	Black	Brown/Black	Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	22.7	83.4	68.3	22.6
	% Carbonates	75.1	3.2	18.0	72.3
	% Other Inorganic	2.2	13.4	13.7	5.1

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-93	5004-93	5004-98	5004-98
Layer Number		2	3	1	2
Lab ID Number		2871661	2871661	2871662	2871662
Sample Location		1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Main Area, Floor, Gray, 12" x 12", On VB, On Concrete Slab	1st Floor, Locker Room, Hallway, On Concrete Slab, 12" x 12", Beige	1st Floor, Locker Room, Hallway, On Concrete Slab, 12" x 12", Beige
Sample Description		Floor Tile, Mastic, Vapor Barrier (Mastic Layer)	Floor Tile, Mastic, Vapor Barrier (Vapor Barrier Layer)	Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	Yes	No	Yes
	Homogenous	Yes	No	Yes	No
	Fibrous	No	Yes	No	No
	Color	Black	Brown/Black	Beige	Black/Beige
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	78.2	62.3	18.7	29.1
	% Carbonates	13.8	14.2	79.4	29.5
	% Other Inorganic	8.0	23.5	1.9	41.4

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-99	5004-99	5004-100	5004-101
Layer Number		1	2		
Lab ID Number		2871663	2871663	2871664	2871665
Sample Location		1st Floor, Locker Room, Hallway to Outside, On Concrete Slab, 12" x 12", Beige	1st Floor, Locker Room, Hallway to Outside, On Concrete Slab, 12" x 12", Beige	1st Floor, Exterior Doors, Weight Room, Door, Metal to Brick	1st Floor, Exterior Doors, Weight Room, Door, Metal to Brick
Sample Description		Floor Tile and Mastic (Tile Layer)	Floor Tile and Mastic (Mastic Layer)	Caulk	Caulk
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	No	Yes	Yes	Yes
	Homogenous	Yes	No	No	No
	Fibrous	No	No	No	No
	Color	Beige	Black/Beige	Gray/Black	Gray/Black
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	18.6	21.4	49.6	46.2
	% Carbonates	79.3	35.0	39.1	38.8
	% Other Inorganic	2.1	43.6	11.3	15.0

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 22-5004 - North Rockland CSD - North Rockland High School - 106 Hammond Road - Thiells, NY

Date Collected : 10/19/2022
Collected By : N. Salerno/J. Mages/S. Conklin
Date Received : 10/19/2022
Date Analyzed : 10/28/2022
Analyzed By : Damien Warner
Signature :
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0
NYS Lab No. 10851

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5004-102	5004-103
Layer Number			
Lab ID Number		2871666	2871667
Sample Location		1st Floor, Exterior Weight Room, Louvre, Metal to Brick	1st Floor, Exterior Weight Room, Louvre, Metal to Brick
Sample Description		Caulk	Caulk
Analytical Method		NOB Tem	NOB Tem
Appearance	Layered	No	No
	Homogenous	Yes	Yes
	Fibrous	No	No
	Color	Gray	Gray
Asbestos Content	% Amosite	ND	ND
	% Chrysotile	ND	ND
	% Other	ND	ND
	% Total Asbestos	ND	ND
Other Materials Present	% Organic	54.6	52.8
	% Carbonates	41.4	39.2
	% Other Inorganic	4.0	8.0

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: North Rockland CSD
ADDRESS: 65 Chapel Street
Garnerville, NY 10923
CONTACT: Paul Rooney 845-942-3028
PROJECT ID: North Rockland High School
106 Hammond Road, Thiells, NY 10984
PROJECT # : 22-5004

SAMPLED BY: N.Salerno, J.Mages & S.Conklin
DATE SAMPLED: 19-Oct-22
ANALYSIS METHOD: PLM/ PLM-NOB/QTEM
TURN-AROUND TIME: 5 Day

	Sample	HM#	Floor	Space Name/ID #	Location	Material
2872209	5004-01	67	FIRST	PRESS BOX	INTERIOR, WALL	MORTAR
2872210	5004-02	67	FIRST	PRESS BOX	INTERIOR, WALL	BLOCK
2872211	5004-03	67	FIRST	PRESS BOX	EXTERIOR, WALL	MORTAR
2872212	5004-04	67	FIRST	PRESS BOX	EXTERIOR, WALL	BLOCK
2872213	5004-05	68	FIRST	PRESS BOX	WALL	BRICK
2872214	5004-06	68	FIRST	PRESS BOX	WALL	BRICK
2872215	5004-07	68	FIRST	PRESS BOX	WALL	MORTAR
2872216	5004-08	68	FIRST	PRESS BOX	WALL	MORTAR
2872217	5004-09	46	FIRST	PRESS BOX	FLOOR	CONCRETE SLAB
2872218	5004-10	46	FIRST	PRESS BOX	FLOOR	CONCRETE SLAB
	5004-11	74	SECOND	PRESS BOX	WALL, ON BLOCK AND MORTAR	COVEBASE MOLDING AND MASTIC
	5004-12	74	SECOND	PRESS BOX	WALL ON BLOCK	COVEBASE MOLDING AND MASTIC
	5004-13	86	SECOND	PRESS BOX	FLOOR, ON WOOD	FLOORING
	5004-14	86	SECOND	PRESS BOX	FLOOR, ON WOOD	FLOORING
2872219	5004-15	67	FIRST	FIELD HOUSE	WALL, CONCESSION AREA	BLOCK

AS LABELED ON PAPERWORK
INITIAL/DATE MP 10/27/22

Comments: Contact rlipinski@qualityenv.com regarding Vermiculite.

SUBMITTED BY: N. Salerno
DATE: 10/19/2022

RECEIVED BY:
DATE: OCT 19'22 19:59

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: **North Rockland CSD**

ADDRESS: **65 Chapel Street**
Garnerville, NY 10923

CONTACT: **Paul Rooney 845-942-3028**

PROJECT ID: **North Rockland High School**
106 Hammond Road, Thiells, NY 10984

PROJECT # : **22-5004**

SAMPLED BY: **N.Salerno, J.Mages & S.Conklin**

DATE SAMPLED: **19-Oct-22**

ANALYSIS METHOD: **PLM/ PLM-NOB/QTEM**

TURN-AROUND TIME: **5 Day**

	Sample	HM#	Floor	Space Name/ID #	Location	Material
2872220	5004-16	67	FIRST	FIELD HOUSE	WALL, CONCESSION AREA	BLOCK
2872221	5004-17	67	FIRST	FIELD HOUSE	WALL, CONCESSION AREA	MORTAR
2872222	5004-18	67	FIRST	FIELD HOUSE	WALL, CONCESSION AREA	MORTAR
2872223	5004-19	46	FIRST	FIELD HOUSE	FLOOR	CONCRETE SLAB
2872224	5004-20	46	FIRST	FIELD HOUSE	FLOOR	CONCRETE SLAB
	5004-21	74	FIRST	FIELD HOUSE	ON WOOD CABINETS, BROWN	COVEBASE MOLDING AND MASTIC
	5004-22	74	FIRST	FIELD HOUSE	ON WOOD CABINETS, BROWN	COVEBASE MOLDING AND MASTIC
	5004-23	81	FIRST	FIELD HOUSE	ON METAL SINK	ANTI-SWEAT TAR
	5004-24	81	FIRST	FIELD HOUSE	ON METAL SINK	ANTI-SWEAT TAR
2872225	5004-25	35	FIRST	FIELD HOUSE	ON SHEETROCK, CEILING	JOINT COMPOUND AND TAPE
2872226	5004-26	35	FIRST	FIELD HOUSE	ON SHEETROCK, WALL	JOINT COMPOUND AND TAPE
2872227	5004-27	30	FIRST	FIELD HOUSE	ON SHEETROCK, WALL	JOINT COMPOUND
2872228	5004-28	51	FIRST	FIELD HOUSE	WALL, PAINT ROOM	SHEETROCK
2872229	5004-29	51	FIRST	FIELD HOUSE	CEILING, CONCESSION AREA	SHEETROCK
2872230	5004-30	73	FIRST	FIELD HOUSE	MENS BATHROOM, WALL	CEMENTITIOUS PANEL

Comments:

SUBMITTED BY: N Salerno

DATE: 10/19/2022

RECEIVED BY: A Mason

DATE: OCT 19'22 19:59

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: North Rockland CSD
ADDRESS: 65 Chapel Street
Garnerville, NY 10923

CONTACT: Paul Rooney 845-942-3028
PROJECT ID: North Rockland High School
106 Hammond Road, Thiells, NY 10984
PROJECT # : 22-5004

SAMPLED BY: N.Salerno, J.Mages & S.Conklin
DATE SAMPLED: 19-Oct-22

ANALYSIS METHOD: PLM/ PLM-NOB/QTEM
TURN-AROUND TIME: 5 Day

Sample	HM#	Floor	Space Name/ID #	Location	Material
2872231 5004-31	73	FIRST	FIELD HOUSE	WOMENS BATHROOM, CEILING	CEMENTITIOUS PANEL
5004-32	87	FIRST	FIELD HOUSE	MENS BATHROOM, WINDOW, METAL TO GLASS	GLAZING
5004-33	87	FIRST	FIELD HOUSE	MENS BATHROOM, WINDOW, METAL TO GLASS	GLAZING
2872232 5004-34	30	FIRST	FIELD HOUSE	CEILING, ON SHEETROCK	JOINT COMPOUND
2872233 5004-35	30	FIRST	FIELD HOUSE	CEILING, ON SHEETROCK	JOINT COMPOUND
5004-36	88	FIRST	FIELD HOUSE	WOMENS BATHROOM, FLOOR, ON CONCRETE SLAB	EPOXY
5004-37	88	FIRST	FIELD HOUSE	MENS BATHROOM, FLOOR, ON CONCRETE SLAB	EPOXY
5004-38	33	FIRST	FIELD HOUSE	PAINT ROOM, ON BACK OF PANELING, ON SHEETROCK	MASTIC
5004-39	33	FIRST	FIELD HOUSE	PAINT ROOM, ON BACK OF PANELING, ON SHEETROCK	MASTIC
5004-40	89,2	ROOF	PRESS BOX	ROOF, TOP LAYER	EDPM AND MASTIC
5004-41	89,2	ROOF	PRESS BOX	ROOF, TOP LAYER	EPDM AND MASTIC
5004-42	8	ROOF	PRESS BOX	ROOF, TERMINATION BAR	CAULK
5004-43	8	ROOF	PRESS BOX	ROOF, TERMINATION BAR	CAULK
5004-44	8	ROOF	PRESS BOX	ROOF, AROUND BEIGE PARAPIT WALL OPENING	CAULK
5004-45	8	ROOF	PRESS BOX	ROOF, AROUND BEIGE PARAPIT WALL OPENING	CAULK

Comments:

SUBMITTED BY: N. Salerno DATE: 10/19/2022

RECEIVED BY: D. Mason DATE: OCT 19'22 19:59

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: **North Rockland CSD**

ADDRESS: **65 Chapel Street**
Garnerville, NY 10923

CONTACT: **Paul Rooney 845-942-3028**

PROJECT ID: **North Rockland High School**
106 Hammond Road, Thiells, NY 10984

PROJECT # : **22-5004**

SAMPLED BY: **N.Salerno, J.Mages & S.Conklin**

DATE SAMPLED: **19-Oct-22**

ANALYSIS METHOD: **PLM/ PLM-NOB/QTEM**

TURN-AROUND TIME: **5 Day**

Sample	HM#	Floor	Space Name/ID #	Location	Material
5004-46	43,90	FIRST	FIELD HOUSE	LOWER ROOF, ON WOOD DECK	ASPHALT SHINGLE AND VAPOR BARRIER
5004-47	43,90	FIRST	FIELD HOUSE	LOWER ROOF, ON WOOD DECK	ASPHALT SHINGLE AND VAPOR BARRIER
5004-48	43	FIRST	FIELD HOUSE	UPPER ROOF, ON WOOD DECK	ASPHALT SHINGLE
5004-49	43	FIRST	FIELD HOUSE	UPPER ROOF, ON WOOD DECK	ASPHALT SHINGLE
2872234 5004-50	91	FIRST	PRESS BOX	TOP OF PARAPIT WALL, CONCRETE COPING STONE	CONCRETE
2872235 5004-51	91	FIRST	PRESS BOX	TOP OF PARAPIT WALL, CONCRETE COPING STONE	CONCRETE
2872236 5004-52	47	FIRST	WEIGHT ROOM	CERAMIC COVE BASE, ON BLOCK WALL	CERAMIC WALL TILE
2872237 5004-53	47	FIRST	WEIGHT ROOM	CERAMIC COVE BASE, ON BLOCK WALL	CERAMIC WALL TILE
2872238 5004-54	92	FIRST	WEIGHT ROOM	COVEBASE, MORTAR, ON BLOCK WALL	MORTAR
2872239 5004-55	92	FIRST	WEIGHT ROOM	COVEBASE, MORTAR, ON BLOCK WALL	MORTAR
2872240 5004-56	46	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, FLOOR	CONCRETE SLAB
2872241 5004-57	46	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, FLOOR	CONCRETE SLAB
5004-58	63	FIRST	WEIGHT ROOM	WEIGHT ROOM OFFICE, FLOOR, ON CONCRETE SLAB	FLOOR TILE AND MASTIC
5004-59	63	FIRST	WEIGHT ROOM	WEIGHT ROOM OFFICE, FLOOR, ON CONCRETE SLAB	FLOOR TILE AND MASTIC
2872242 5004-60	47,2	FIRST	WEIGHT ROOM	SHOWERS, FLOOR, ON SETTING BED	CERAMIC TILE AND MORTAR

Comments:

SUBMITTED BY: Nicholas Salerno

DATE: 10/19/2022

RECEIVED BY: D. Hudson

OCT 19'22 19:59

DATE:

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: **North Rockland CSD**

ADDRESS: **65 Chapel Street**
Garnerville, NY 10923

CONTACT: **Paul Rooney 845-942-3028**

PROJECT ID: **North Rockland High School**
106 Hammond Road, Thiells, NY 10984

PROJECT # : **22-5004**

SAMPLED BY: **N.Salerno, J.Mages & S.Conklin**

DATE SAMPLED: **19-Oct-22**

ANALYSIS METHOD: **PLM/ PLM-NOB/QTEM**

TURN-AROUND TIME: **5 Day**

	Sample	HM#	Floor	Space Name/ID #	Location	Material
2872243	5004-61	47, 92	FIRST	WEIGHT ROOM	SHOWERS, FLOOR, ON SETTING BED	CERAMIC TILE AND MORTAR
2872244	5004-62	49	FIRST	WEIGHT ROOM	SHOWERS, FLOOR, UNDER TILE, ON CONCRETE SLAB	SETTING BED
2872245	5004-63	49	FIRST	WEIGHT ROOM	SHOWERS, FLOOR, UNDER TILE, ON CONCRETE SLAB	SETTING BED
2872246	5004-64	78	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, WET WALL, ON METAL PIPE	MUDDED JOINT PACKING
2872247	5004-65	78	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, WET WALL, ON METAL PIPE	MUDDED JOINT PACKING
2872248	5004-66	61	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, WET WALL, ON METAL PIPE, FIBERGLASS	PIPE INSULATION
2872249	5004-67	61	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, WET WALL, ON METAL PIPE, FIBERGLASS	PIPE INSULATION
2872250	5004-68	78	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, GYM STORAGE, ON METAL PIPE	MUDDED JOINT PACKING
	5004-69	93	FIRST	WEIGHT ROOM	WEIGHT ROOM OFFICE, SUSPENDED CEILING, 2X2, DOT CANYON	CEILING TILE
	5004-70	93	FIRST	WEIGHT ROOM	WEIGHT ROOM OFFICE, SUSPENDED CEILING, 2X2, DOT CANYON	CEILING TILE
	5004-71	57	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, STORAGE, ON METAL DUCT	PIN MASTIC
	5004-72	57	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, STORAGE, ON METAL DUCT	PIN MASTIC
	5004-73	2	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, UNDER FLOORING, MATS	ADHESIVE
	5004-74	2	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, UNDER FLOORING, MATS	ADHESIVE
	5004-75	8	FIRST	WEIGHT ROOM	INTERIOR DOOR FRAME, FRAME METAL TO BLOCK	CAULK

Comments:

SUBMITTED BY: Nicholas Salerno

DATE: 10/19/2022

RECEIVED BY:

OCT 19'22 19:59

DATE:

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: North Rockland CSD

SAMPLED BY: N.Salerno, J.Mages & S.Conklin

ADDRESS: 65 Chapel Street
Garnerville, NY 10923

DATE SAMPLED: 19-Oct-22

CONTACT: Paul Rooney 845-942-3028

ANALYSIS METHOD: PLM/ PLM-NOB/QTEM

PROJECT ID: North Rockland High School
106 Hammond Road, Thiells, NY 10984

TURN-AROUND TIME: 5 Day

PROJECT # : 22-5004

	Sample	HM#	Floor	Space Name/ID #	Location	Material
	5004-76	8	FIRST	WEIGHT ROOM	INTERIOR DOOR FRAME, FRAME METAL TO BLOCK	CAULK
	5004-77	8	FIRST	WEIGHT ROOM	DOUBLE DOOR, EAST WEIGHT ROOM, METAL TO BLOCK	CAULK
	5004-78	8	FIRST	WEIGHT ROOM	DOUBLE DOOR, EAST WEIGHT ROOM, METAL TO BLOCK	CAULK
2872251	5004-79	35	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, CEILING ON SHEETROCK	JOINT COMPOUND AND TAPE
2872252	5004-80	35	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, CEILING ON SHEETROCK	JOINT COMPOUND AND TAPE
2872253	5004-81	30	FIRST	WEIGHT ROOM	WEST WEIGHT ROOM, CEILING ON SHEETROCK	JOINT COMPOUND
2872254	5004-82	69	FIRST	WEIGHT ROOM	OLD SHOWER ROOM, CEILING, TEXTURED	PLASTER
2872255	5004-83	69	FIRST	WEIGHT ROOM	OLD SHOWER ROOM, CEILING, TEXTURED	PLASTER
2872256	5004-84	69	FIRST	WEIGHT ROOM	OLD SHOWER ROOM, CEILING, TEXTURED	PLASTER
2872257	5004-85	51	FIRST	WEIGHT ROOM	SHOWER STORAGE, WALL	SHEETROCK
2872258	5004-86	51	FIRST	WEIGHT ROOM	EAST WEIGHT ROOM, CEILING	SHEETROCK
2872259	5004-87	30	FIRST	LOCKER ROOM	MAIN AREA, WALL, ON SHEETROCK	JOINT COMPOUND
2872260	5004-88	30	FIRST	LOCKER ROOM	MAIN AREA, WALL, ON SHEETROCK	JOINT COMPOUND
2872261	5004-89	30	FIRST	LOCKER ROOM	MAIN AREA, CEILING, ON SHEETROCKK	JOINT COMPOUND
2872262	5004-90	51	FIRST	LOCKER ROOM	MAIN AREA, CEILING	SHEETROCK

Comments:

SUBMITTED BY: Nicholas Salerno DATE: 10/19/2022

RECEIVED BY: D. Wagner DATE: OCT 19 '22 19:59

Quality Environmental Solutions and Technologies, Inc.
Bulk Sample Chain of Custody

CLIENT: **North Rockland CSD**

ADDRESS: **65 Chapel Street**
Garnerville, NY 10923

CONTACT: **Paul Rooney 845-942-3028**

PROJECT ID: **North Rockland High School**
106 Hammond Road, Thiells, NY 10984

PROJECT # : **22-5004**

SAMPLED BY: **N.Salerno, J.Mages & S.Conklin**

DATE SAMPLED: **19-Oct-22**

ANALYSIS METHOD: **PLM/ PLM-NOB/GTEM**

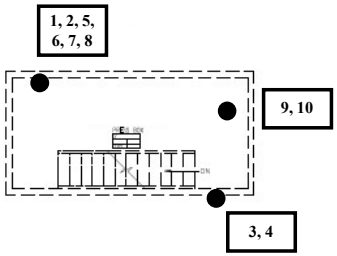
TURN-AROUND TIME: **5 Day**

	Sample	HM#	Floor	Space Name/ID #	Location	Material
2872263	5004-91	51	FIRST	LOCKER ROOM	MAIN AREA, WALL	SHEETROCK
	5004-92	63,90	FIRST	LOCKER ROOM	MAIN AREA, FLOOR, GREY, 12"X12", ON VAPOR BARRIER, ON CONCRETE SLAB	FLOOR TILE, MASTIC, VAPOR BARRIER
	5004-93	63,90	FIRST	LOCKER ROOM	MAIN AREA, FLOOR, GREY, 12"X12", ON VAPOR BARRIER, ON CONCRETE SLAB	FLOOR TILE, MASTIC, VAPOR BARRIER
2872264	5004-94	46	FIRST	LOCKER ROOM	MAIN AREA, UNDER FLOOR TILE, MATSIC AND VAPOR BARRIER	CONCRETE SLAB
2872265	5004-95	46	FIRST	LOCKER ROOM	TRAINING ROOM, UNDER FLOOR TILE AND MASTIC	CONCRETE SLAB
2872266	5004-96	67	FIRST	LOCKER ROOM	MAIN AREA, WALL	BLOCK AND MORTAR
2872267	5004-97	67	FIRST	LOCKER ROOM	TRAINING ROOM, WALL	BLOCK AND MORTAR
	5004-98	63	FIRST	LOCKER ROOM	HALLWAY, ON CONCRETE SLAB, 12"X12", BEIGE	FLOOR TILE AND MASTIC
	5004-99	63	FIRST	LOCKER ROOM	HALLWAY TO OUTSIDE, ON CONCRETE SLAB, 12"X12", BEIGE	FLOOR TILE AND MASTIC
	5004-100	8	FIRST	EXTERIOR DOORS, WEIGHT ROOM	DOOR, METAL TO BRICK	CAULK
	5004-101	8	FIRST	EXTERIOR DOORS, WEIGHT ROOM	DOOR, METAL TO BRICK	CAULK
	5004-102	8	FIRST	EXTERIOR WEIGHT ROOM	LOUVRE, METAL TO BRICK	CAULK
	5004-103	8	FIRST	EXTERIOR WEIGHT ROOM	LOUVRE, METAL TO BRICK	CAULK

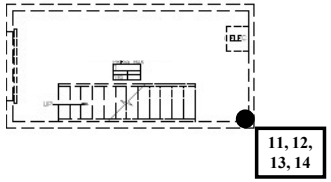
Comments:

SUBMITTED BY: Nicholas Salerno DATE: 10/19/2022

RECEIVED BY: D Mason DATE: OCT 19'22 19:59



PRESS BOX SECOND FLOOR



PRESS BOX FIRST FLOOR

SAMPLE LOCATION KEY	
●	Sample Location (Non-ACM)
●	Sample Location (ACM)

N

Drawing Not to Scale
This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

Quality Environmental
Solutions & Technologies, Inc.
1376 Route 9
Wappingers Falls, NY 12590
Phone: (845) 298- 6031
Fax: (845) 298-6251

CLIENT

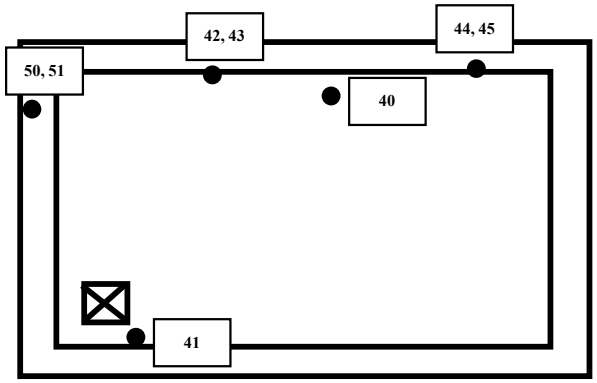
NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

FIRST & SECOND FLOORS SAMPLE LOCATIONS

SL-01



SAMPLE LOCATION KEY	
●	Sample Location (Non-ACM)
●	Sample Location (ACM)

N

Drawing Not to Scale
This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

Quality Environmental
Solutions & Technologies, Inc.
1376 Route 9
Wappingers Falls, NY 12590
Phone: (845) 298- 6031
Fax: (845) 298-6251

CLIENT

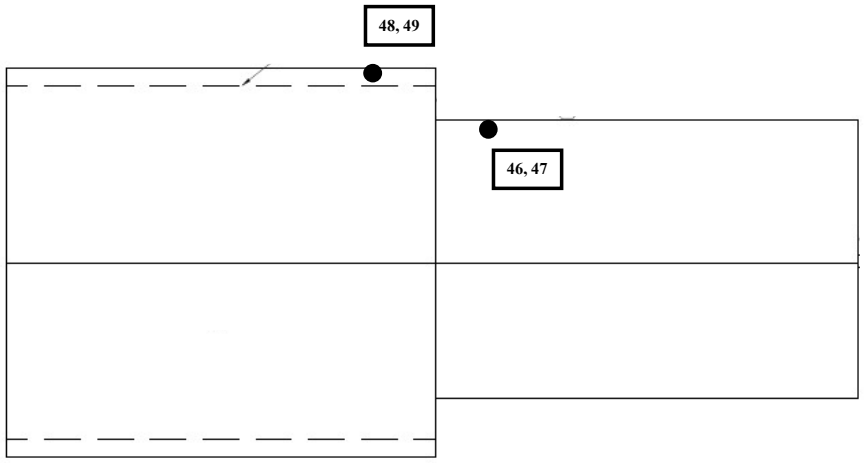
NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

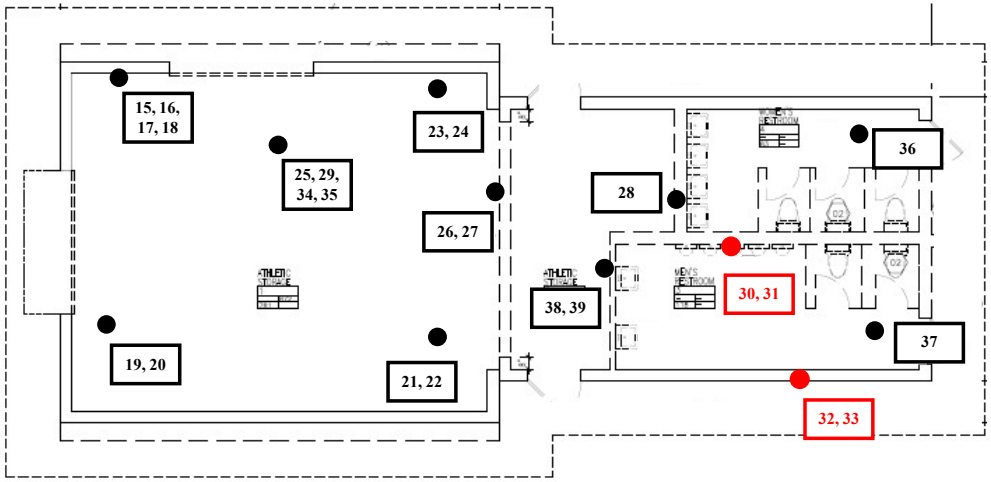
NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

PRESS BOX
ROOF
SAMPLE LOCATIONS

SL-02



FIELDHOUSE ROOF



FIELDHOUSE

SAMPLE LOCATION KEY	
●	Sample Location (Non-ACM)
●	Sample Location (ACM)

N

Drawing Not to Scale

This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

Quality Environmental Solutions & Technologies, Inc.
1376 Route 9
Wappingers Falls, NY 12590
Phone: (845) 298- 6031
Fax: (845) 298-6251

CLIENT

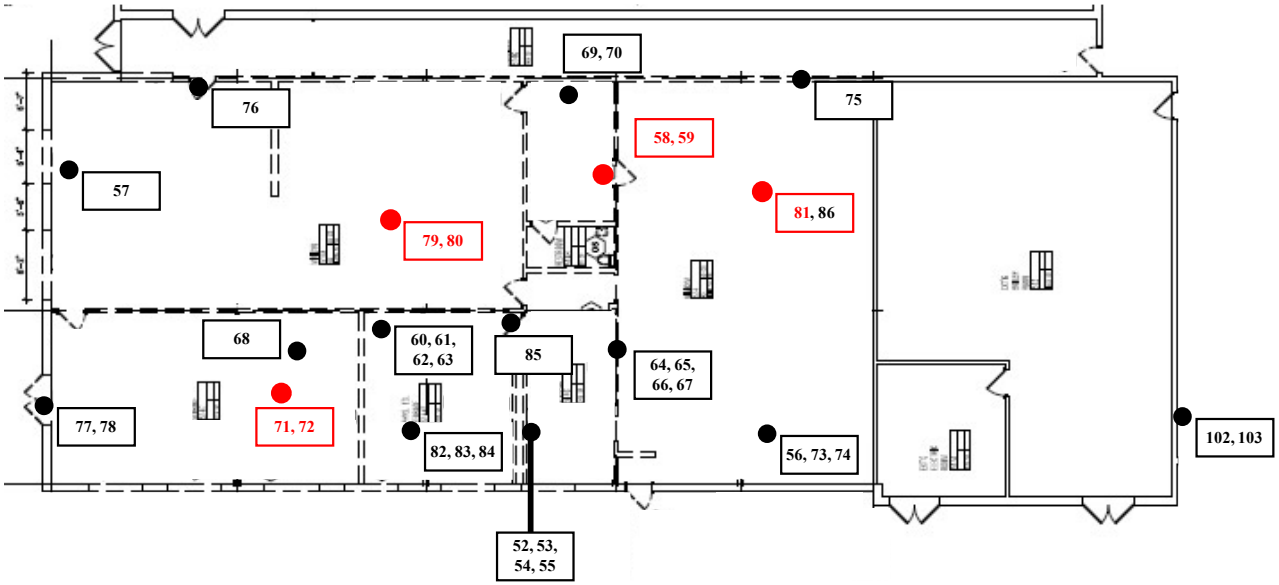
NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

FIELD HOUSE INTERIOR/EXTERIOR SAMPLE LOCATIONS

SL-03



SAMPLE LOCATION KEY	
●	Sample Location (Non-ACM)
●	Sample Location (ACM)

N

Drawing Not to Scale
This Drawing is not intended to be used as the sole basis for soliciting pricing for asbestos abatement. An abatement plan, specification, drawing and/or variances should be developed to identify scope, timing, phasing and remediation means & methods for any asbestos project.

Date: 11/1/2022	**Version #** 1
Issued For: Asbestos Survey	
QuES&T Project #: 22-5004	
Project Manager: RL	**Prepared By:** NDS

QuES&T

Quality Environmental
Solutions & Technologies, Inc.
1376 Route 9
Wappingers Falls, NY 12590
Phone: (845) 298- 6031
Fax: (845) 298-6251

CLIENT

NORTH ROCKLAND CSD
65 Chapel Street
Garnerville, NY 10923

PROJECT LOCATION

NORTH ROCKLAND HIGH SCHOOL
106 Hammond Road
Thiells, NY 10984

WEIGHT ROOM AREA SAMPLE LOCATIONS

SL-04

QuES&T
Quality Environmental Solutions & Technologies, Inc.

Appendix C:
LEAD BASED PAINT PHOTOS
& XRF ANALYTICAL DATA

ABOVE: WEIGHT ROOM STORAGE – LBP EXTERIOR DOOR LINTEL
BELOW: HIGH SCHOOL – LBP CERAMIC WALL BASE – TYPICAL

Quality Environmental Solutions & Technologies
1376 Route 9
Wappingers Falls, NY 12590
(845) 298-6031

Limited XRF LBP Testing

North Rockland CSD
65 Chapel Street
Garnerville, NY 10923
@North Rockland High School
22-5004

Sample	***Building/Address***	***Interior/Exterior***	***Floor***	***Space/Room/Description***	***Object***	***Component***	***Substrate***	***Color***	***Condition***	***Result***	***Pb Concentration (mg/cm2)***
1	Shutter Calibration										3.58
2	NIST (<0.01)									Negative	0
3	***NIST (1.04 +/- 0.06)***									***Positive***	***1.1***
4	North Rockland High School	Interior	2nd	Press Box	Wall		Concrete	White	Good	Negative	0
5	North Rockland High School	Interior	2nd	Press Box	Wall	Cove Base	Vinyl	Black	Good	Negative	0
6	North Rockland High School	Interior	2nd	Press Box	Staircase	Railing	Wood	White	Good	Negative	0
7	North Rockland High School	Interior	2nd	Press Box	Roll Window	Frame	Metal	White	Good	Negative	0
8	North Rockland High School	Exterior	Ground	Press Box	Wall		Concrete	White	Good	Negative	0
9	North Rockland High School	Exterior	Ground	Press Box	Roll Door	Frame	Metal	Grey	Good	Negative	0
10	North Rockland High School	Exterior	Ground	Field House	Wall		Concrete	White	Good	Negative	0
11	North Rockland High School	Exterior	Ground	Field House	Serving Window	Frame	Metal	Red	Good	Negative	0.04
12	North Rockland High School	Exterior	Ground	Field House	Serving Window	Cover	Metal	Red	Good	Negative	-0.83
13	North Rockland High School	Exterior	Ground	Field House	Door		Metal	Red	Good	Negative	0.03
14	North Rockland High School	Exterior	Ground	Field House	Door	Casing	Metal	Red	Good	Negative	-0.52
15	North Rockland High School	Exterior	Ground	Field House	Conduit Pipe		Metal	White	Good	Negative	0
16	North Rockland High School	Exterior	Ground	Field House	Serving Window	Overhand	Wood	White	Good	Negative	0
17	North Rockland High School	Exterior	Ground	Field House	Façade	Top Trim	Wood	Red	Good	Negative	0
18	North Rockland High School	Interior	1st	Field House - Concession Room	Floor		Concrete	Grey	Good	Negative	0
19	North Rockland High School	Interior	1st	Field House - Concession Room	Wall		Concrete	White	Good	Negative	0
20	North Rockland High School	Interior	1st	Field House - Concession Room	Wall		Concrete	Red	Good	Negative	0
21	North Rockland High School	Interior	1st	Field House - Concession Room	Roll Door	Casing	Wood	Red	Good	Negative	0
22	North Rockland High School	Interior	1st	Field House - Concession Room	Serving Window	Lintel	Wood	White	Good	Negative	0
23	North Rockland High School	Interior	1st	Field House - Concession Room	Ceiling		Sheetrock	White	Good	Negative	0
24	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Door		Metal	Beige	Good	Negative	0
25	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Door	Frame	Metal	Beige	Good	Negative	0.01
26	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Toilet		Porcelain	White	Good	Negative	0.02
27	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Urinal		Porcelain	White	Good	Negative	0.29
28	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Sink		Porcelain	White	Good	Negative	-0.09
29	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Wall	Cove Base	Vinyl	Black	Good	Negative	0
30	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Radiator	Cover	Metal	Beige	Good	Negative	-0.78
31	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Wall	Panel	Transite	White	Good	Negative	0
32	North Rockland High School	Interior	1st	Field House - Men's Bathroom	Wall	Trim	Wood	White	Good	Negative	0
33	North Rockland High School	Exterior	Ground	Façade	Wall	Lock Box	Metal	Red	Good	Negative	0.7
34	North Rockland High School	Interior	1st	West Weight Room	Wall		Concrete	White	Good	Negative	0
35	North Rockland High School	Interior	1st	West Weight Room	Wall		Concrete	Red	Good	Negative	0
36	North Rockland High School	Interior	1st	West Weight Room	Door		Metal	Red	Good	Negative	0.7
37	North Rockland High School	Interior	1st	West Weight Room	Door	Casing	Metal	Red	Good	Negative	0
38	North Rockland High School	Interior	1st	West Weight Room	Tack Board		Cork	Red	Good	Negative	0
39	North Rockland High School	Interior	1st	Weight Room Office	Door		Metal	Red	Good	Negative	0.14
40	North Rockland High School	Interior	1st	Weight Room Office	Door	Casing	Metal	Red	Good	Negative	0.08
41	***North Rockland High School***	***Interior***	***1st***	***Weight Room Office***	***Wall***	***Cove Base***	***Vinyl***	***Beige***	***Good***	***Positive***	***1.5***
42	North Rockland High School	Interior	1st	Weight Room Office	Window	Casing	Metal	Red	Good	Negative	0.06
43	North Rockland High School	Interior	1st	Weight Room Office Bathroom	Ceiling		Sheetrock	White	Good	Negative	0
44	North Rockland High School	Interior	1st	East Weight Room Storage	Wall		Concrete	Beige	Good	Negative	0
45	North Rockland High School	Interior	1st	East Weight Room Storage	Exterior Door	Casing	Metal	Brown	Good	Negative	0.11

Conducted: October 18, 2022
Niton XRF Technician(s): Nicholas Salerno

Quality Environmental Solutions & Technologies
1376 Route 9
Wappingers Falls, NY 12590
(845) 298-6031

Limited XRF LBP Testing

North Rockland CSD
65 Chapel Street
Garnerville, NY 10923
@North Rockland High School
22-5004

46	***North Rockland High School***	***Interior***	***1st***	***East Weight Room Storage***	***Exterior Door***	***Lintel***	***Metal***	***Brown***	***Good***	***Positive***	***1.1***
47	North Rockland High School	Interior	1st	East Weight Room Storage	Duct		Metal	Orange	Good	Negative	0.7
48	North Rockland High School	Interior	1st	East Weight Room Storage	Ceiling	Support Beam	Metal	White	Good	Negative	0.02
49	North Rockland High School	Interior	1st	East Weight Room Storage	Ceiling	Deck	Metal	White	Good	Negative	0.03
50	North Rockland High School	Interior	1st	East Weight Room Storage	Hot Water Pipe	Saddle	Metal	Red	Good	Negative	0
51	North Rockland High School	Interior	1st	East Weight Room Storage	Air Handling Unit	Body	Metal	Dark Green	Good	Negative	0
52	North Rockland High School	Interior	1st	East Weight Room Storage	Air Handling Unit	Motor	Metal	Grey	Good	Negative	0.01
53	North Rockland High School	Interior	1st	Weight Room Shower Storage	Floor	Tile	Ceramic	Brown	Good	Negative	0.02
54	***North Rockland High School***	***Interior***	***1st***	***Weight Room Shower Storage***	***Wall***	***Cove Base***	***Ceramic***	***Beige***	***Good***	***Positive***	***2***
55	North Rockland High School	Interior	1st	Weight Room Shower Storage	Ceiling		Plaster	White	Good	Negative	0
56	***North Rockland High School***	***Interior***	***1st***	***Weight Room Center Storage***	***Wall***	***Cove Base***	***Ceramic***	***Beige***	***Good***	***Positive***	***2.4***
57	***North Rockland High School***	***Interior***	***1st***	***Weight Room Office Bathroom***	***Wall***	***Cove Base***	***Ceramic***	***Beige***	***Good***	***Positive***	***2.6***
58	***North Rockland High School***	***Interior***	***1st***	***Athletic Trainers Office Bathroom***	***Wall***	***Cove Base***	***Ceramic***	***Beige***	***Good***	***Positive***	***2.5***
59	***North Rockland High School***	***Interior***	***1st***	***Athletic Trainers Office***	***Wall***	***Cove Base***	***Vinyl***	***Beige***	***Good***	***Positive***	***2.7***
60	North Rockland High School	Interior	1st	Physical Therapy Room	Wall		Concrete	White	Good	Negative	0.02
61	North Rockland High School	Interior	1st	Physical Therapy Room	Window	Casing	Metal	Red	Good	Negative	0.04
62	North Rockland High School	Interior	1st	Physical Therapy Room	Wall		Sheetrock	White	Good	Negative	0
63	North Rockland High School	Interior	1st	Physical Therapy Room	Ceiling		Sheetrock	White	Good	Negative	0
64	North Rockland High School	Interior	1st	Physical Therapy Room	Wall	Cove Base	Vinyl	Black	Good	Negative	0
65	North Rockland High School	Interior	1st	Physical Therapy Room	Door	Casing	Metal	Red	Good	Negative	0
66	North Rockland High School	Interior	1st	Training Room	Wall		Sheetrock	Beige	Good	Negative	0
67	North Rockland High School	Interior	1st	Training Room	Wall		Concrete	White	Good	Negative	0.01
68	North Rockland High School	Interior	1st	Training Room	Wall		Concrete	Yellow	Good	Negative	0.05
69	North Rockland High School	Interior	1st	Training Room	Doorway	Casing	Metal	Red	Good	Negative	0.05
70	***North Rockland High School***	***Interior***	***1st***	***Training Room***	***Wall***	***Support Beam***	***Metal***	***White***	***Good***	***Positive***	***3***
71	North Rockland High School	Interior	1st	Training Room	Wall		Concrete	Beige	Good	Negative	0.04
72	NIST (<0.01)									Negative	0
73	NIST (1.04 +/- 0.06)									Negative	0.9

Conducted: October 18, 2022
Niton XRF Technician(s): Nicholas Salerno

QuES&T
Quality Environmental Solutions & Technologies, Inc.

Appendix D:
PCB ANALYTICAL DATA

1376 Route 9, Wappingers Falls, NY 12590 Phone (845) 298-6031 Fax (845) 298-6251
NYS MWBD MBE Cert # 49952-2006 NYSUCP DBE Certified NJUCP DBE Certified www.Qualityenv.com

Technical Report

prepared for:

QuES & T
1376 Rt. 9
Wappingers Falls NY, 12590
Attention: Rudy Lipinski

Report Date: 10/24/2022
Client Project ID: 22-4995 Hazardous Materials Survey
York Project (SDG) No.: 22J0900

CT Cert. No. PH-0723 New Jersey Cert. No. CT005 and NY037 New York Cert. Nos. 10854 and 12058 PA Cert. No. 68-04440

120 RESEARCH DRIVE STRATFORD, CT 06615 ■ 132-02 89th AVENUE RICHMOND HILL, NY 11418
www.YORKLAB.com (203) 325-1371 FAX (203) 357-0166 ClientServices@yorklab.com

Report Date: 10/24/2022
Client Project ID: 22-4995 Hazardous Materials Survey
York Project (SDG) No.: 22J0900

QuES & T
1376 Rt. 9
Wappingers Falls NY, 12590
Attention: Rudy Lipinski

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on October 18, 2022 and listed below. The project was identified as your project: **22-4995 Hazardous Materials Survey**.

The analyses were conducted utilizing appropriate EPA, Standard Methods, and ASTM methods as detailed in the data summary tables.

All samples were received in proper condition meeting the customary acceptance requirements for environmental samples except those indicated under the Sample and Analysis Qualifiers section of this report.

All analyses met the method and laboratory standard operating procedure requirements except as indicated by any data flags, the meaning of which are explained in the Sample and Data Qualifiers Relating to This Work Order section of this report and case narrative if applicable.

The results of the analyses, which are all reported on dry weight basis (soils) unless otherwise noted, are detailed in the following pages.

Please contact Client Services at 203.325.1371 with any questions regarding this report.

York Sample ID	Client Sample ID	Matrix	Date Collected	Date Received
22J0900-01	4995-PCB-01	Caulk	10/17/2022	10/18/2022
22J0900-02	4995-PCB-02	Caulk	10/17/2022	10/18/2022
22J0900-03	4995-PCB-03	Caulk	10/17/2022	10/18/2022
22J0900-04	4995-PCB-04	Caulk	10/17/2022	10/18/2022

General Notes for York Project (SDG) No.: 22J0900

1. The RLs and MDLs (Reporting Limit and Method Detection Limit respectively) reported are adjusted for any dilution necessary due to the levels of target and/or non-target analytes and matrix interference. The RL(REPORTING LIMIT) is based upon the lowest standard utilized for the calibration where applicable.
2. Samples are retained for a period of thirty days after submittal of report, unless other arrangements are made.
3. York's liability for the above data is limited to the dollar value paid to York for the referenced project.
4. This report shall not be reproduced without the written approval of York Analytical Laboratories, Inc.
5. All analyses conducted met method or Laboratory SOP requirements. See the Sample and Data Qualifiers Section for further information.
6. It is noted that no analyses reported herein were subcontracted to another laboratory, unless noted in the report.
7. This report reflects results that relate only to the samples submitted on the attached chain-of-custody form(s) received by York.
8. Analyses conducted at York Analytical Laboratories, Inc. Stratford, CT are indicated by NY Cert. No. 10854; those conducted at York Analytical Laboratories, Inc., Richmond Hill, NY are indicated by NY Cert. No. 12058.

Approved By:  **Date:** 10/24/2022

Cassie L. Mosher
Laboratory Manager

Sample Information

Client Sample ID: 4995-PCB-01 **York Sample ID:** 22J0900-01

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22J0900	22-4995 Hazardous Materials Survey	Caulk	October 17, 2022 3:00 pm	10/18/2022

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
11104-28-2	Aroclor 1221	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
11141-16-5	Aroclor 1232	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
53469-21-9	Aroclor 1242	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
12672-29-6	Aroclor 1248	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
11097-69-1	Aroclor 1254	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
11096-82-5	Aroclor 1260	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:35	BJ
1336-36-3	* Total PCBs	ND		mg/kg	0.442	1	EPA 8082A Certifications:	10/20/2022 12:45	10/23/2022 23:35	BJ

	Surrogate Recoveries	Result	Acceptance Range
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*99.5 %*	*30-140*
2051-24-3	*Surrogate: Decachlorobiphenyl*	*95.5 %*	*30-140*

Sample Information

Client Sample ID: 4995-PCB-02 **York Sample ID:** 22J0900-02

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22J0900	22-4995 Hazardous Materials Survey	Caulk	October 17, 2022 3:00 pm	10/18/2022

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ
11104-28-2	Aroclor 1221	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ
11141-16-5	Aroclor 1232	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ

Sample Information

Client Sample ID: 4995-PCB-02 **York Sample ID:** 22J0900-02

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22J0900	22-4995 Hazardous Materials Survey	Caulk	October 17, 2022 3:00 pm	10/18/2022

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
53469-21-9	Aroclor 1242	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ
12672-29-6	Aroclor 1248	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ
11097-69-1	Aroclor 1254	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ
11096-82-5	Aroclor 1260	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/23/2022 23:49	BJ
1336-36-3	* Total PCBs	ND		mg/kg	0.455	1	EPA 8082A Certifications:	10/20/2022 12:45	10/23/2022 23:49	BJ

	Surrogate Recoveries	Result	Acceptance Range
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*94.0 %*	*30-140*
2051-24-3	*Surrogate: Decachlorobiphenyl*	*88.0 %*	*30-140*

Sample Information

Client Sample ID: 4995-PCB-03 **York Sample ID:** 22J0900-03

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22J0900	22-4995 Hazardous Materials Survey	Caulk	October 17, 2022 3:00 pm	10/18/2022

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ
11104-28-2	Aroclor 1221	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ
11141-16-5	Aroclor 1232	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ
53469-21-9	Aroclor 1242	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ
12672-29-6	Aroclor 1248	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ
11097-69-1	Aroclor 1254	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ
11096-82-5	Aroclor 1260	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:03	BJ

Sample Information

Client Sample ID: 4995-PCB-03 **York Sample ID:** 22J0900-03

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22J0900	22-4995 Hazardous Materials Survey	Caulk	October 17, 2022 3:00 pm	10/18/2022

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
1336-36-3	* Total PCBs	ND		mg/kg	0.284	1	EPA 8082A Certifications:	10/20/2022 12:45	10/24/2022 00:03	BJ

	Surrogate Recoveries	Result	Acceptance Range
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*97.5 %*	*30-140*
2051-24-3	*Surrogate: Decachlorobiphenyl*	*85.5 %*	*30-140*

Sample Information

Client Sample ID: 4995-PCB-04 **York Sample ID:** 22J0900-04

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22J0900	22-4995 Hazardous Materials Survey	Caulk	October 17, 2022 3:00 pm	10/18/2022

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
11104-28-2	Aroclor 1221	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
11141-16-5	Aroclor 1232	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
53469-21-9	Aroclor 1242	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
12672-29-6	Aroclor 1248	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
11097-69-1	Aroclor 1254	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
11096-82-5	Aroclor 1260	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45 NELAC-NY10854,CTDOH,NJDEP	10/24/2022 00:16	BJ
1336-36-3	* Total PCBs	ND		mg/kg	0.340	1	EPA 8082A Certifications:	10/20/2022 12:45	10/24/2022 00:16	BJ

	Surrogate Recoveries	Result	Acceptance Range
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*93.0 %*	*30-140*
2051-24-3	*Surrogate: Decachlorobiphenyl*	*92.0 %*	*30-140*

Sample and Data Qualifiers Relating to This Work Order

Definitions and Other Explanations

*	Analyte is not certified or the state of the samples origination does not offer certification for the Analyte.
ND	NOT DETECTED - the analyte is not detected at the Reported to level (LOQ/RL or LOD/MDL)
RL	REPORTING LIMIT - the minimum reportable value based upon the lowest point in the analyte calibration curve.
LOQ	LIMIT OF QUANTITATION - the minimum concentration of a target analyte that can be reported within a specified degree of confidence. This is the lowest point in an analyte calibration curve that has been subjected to all steps of the processing/analysis and verified to meet defined criteria. This is based upon current NELAC/TNI Standards and applies to all analyses.
LOD	LIMIT OF DETECTION - a verified estimate of the minimum concentration of a substance in a given matrix that an analytical process can reliably detect. This is based upon NELAC 2009 Standards and applies to all analyses conducted under the auspices of EPA SW-846.
MDL	METHOD DETECTION LIMIT - a statistically derived estimate of the minimum amount of a substance an analytical system can reliably detect with a 99% confidence that the concentration of the substance is greater than zero. This is based upon 40 CFR Part 136 Appendix B and applies only to EPA 600 and 200 series methods.
Reported to	This indicates that the data for a particular analysis is reported to either the LOD/MDL, or the LOQ/RL. In cases where the "Reported to" is located above the LOD/MDL, any value between this and the LOQ represents an estimated value which is "J" flagged accordingly. This applies to volatile and semi-volatile target compounds only.
NR	Not reported
RPD	Relative Percent Difference
Wet	The data has been reported on an as-received (wet weight) basis
Low Bias	Low Bias flag indicates that the recovery of the flagged analyte is below the laboratory or regulatory lower control limit. The data user should take note that this analyte may be biased low but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
High Bias	High Bias flag indicates that the recovery of the flagged analyte is above the laboratory or regulatory upper control limit. The data user should take note that this analyte may be biased high but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
Non-Dir.	Non-dir. flag (Non-Directional Bias) indicates that the Relative Percent Difference (RPD) (a measure of precision) among the MS and MSD data is outside the laboratory or regulatory control limit. This alerts the data user where the MS and MSD are from site-specific samples that the RPD is high due to either non-homogeneous distribution of target analyte between the MS/MSD or indicates poor reproducibility for other reasons.

If EPA SW-846 method 8270 is included herein it is noted that the target compound N-nitrosodiphenylamine (NDPA) decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine (DPA). These results could actually represent 100% DPA, 100% NDPA or some combination of the two. For this reason, York reports the combined result for n-nitrosodiphenylamine and diphenylamine for either of these compounds as a combined concentration as Diphenylamine.

If Total PCBs are detected and the target aroclors reported are "Not detected", the Total PCB value is reported due to the presence of either or both Aroclors 1262 and 1268 which are non-target aroclors for some regulatory lists.

2-chloroethylvinyl ether readily breaks down under acidic conditions. Samples that are acid preserved, including standards will exhibit breakdown. The data user should take note.

Certification for pH is no longer offered by NYDOH ELAP.

Semi-Volatile and Volatile analyses are reported down to the LOD/MDL, with values between the LOD/MDL and the LOQ being "J" flagged as estimated results.

For analyses by EPA SW-846-8270D, the Limit of Quantitation (LOQ) reported for benzidine is based upon the lowest standard used for calibration and is not a verified LOQ due to this compound's propensity for oxidative losses during extraction/concentration procedures and non-reproducible chromatographic performance.

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

22J0900 Received by: Andrew Stark 10/18/22 10:4

BULK SAMPLE FORM

York Analytical Laboratories, Inc.
120 Research Drive
Stratford, CT 06615
ph. (203) 325-1371
fx. (203) 357-0166

Field Chain-of-Custody Record

Relinquished by: Andrew S. York 10/18 1637

Rec in Lab: K Blockjun 4.1°C 10/18/22 1637

Company: **QuES&T**
1376 Route 9
Wappingers Falls, NY 12590

Sampled By (Print): **S. Talsma/Z. Timpano**

Sampled By (Sign.): S. Talsma

Results Send Via: rlipinski@qualityenv.com

Invoice to: **Angela Holzapfel**

Project #: **22-4995**

Project ID: **Hazardous Materials Survey**

SAMPLE #	LOCATION	SAMPLE DATE	MATRIX	ANALYSIS REQUESTED	CONTAINER
4995-PCB-01	Exterior, Façade, Expansion Joint, Brick to Brick	10/17/2022	Caulk (Tan)	PCB	4 oz. Glass Jar
4995-PCB-02	Exterior, Window, Metal Frame to Brick	10/17/2022	Caulk (Brown)	PCB	4 oz. Glass Jar
4995-PCB-03	Exterior, Door, Entry Slab to Building Foundation	10/17/2022	Caulk (Grey)	PCB	4 oz. Glass Jar
4995-PCB-04	Exterior, Door, Metal Frame to Brick and Mortar	10/17/2022	Caulk (Tan)	PCB	4 oz. Glass Jar

ANALYSIS TURNAROUND: **5-Day Turn-Around - Please call for any additional questions regarding Analysis**

PAGE__1__OF__1

Appendix E:
PERSONNEL LICENSES & CERTIFICATIONS

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Quality Environmental Solutions & Technologies, Inc.

1376 Route 9

Wappinger Falls, NY 12590

FILE NUMBER: 99-0018
LICENSE NUMBER: 29085
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 01/21/2022
EXPIRATION DATE: 01/31/2023

Duly Authorized Representative – Lawrence J Holzapfel:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

SH 432 (8/12)

NEW YORK STATE

MINORITY- AND WOMEN-OWNED BUSINESS ENTERPRISE ("MWBE")

CERTIFICATION

Empire State Development's Division of Minority and Women's Business Development grants a

Women Business Enterprise (WBE)

pursuant to New York State Executive Law, Article 15-A to:

Quality Environmental Solutions & Technologies Inc.

Certification Awarded on: March 28, 2019
Expiration Date: March 28, 2024
File ID#: WBE- 49952

NEW YORK STATE OF OPPORTUNITY. Division of Minority and Women's Business Development

A Division of Empire State Development

NEW YORK STATE DEPARTMENT OF HEALTH

RADIOACTIVE MATERIALS LICENSE

Pursuant to the Public Health Law, Part 16 of the New York State Sanitary Code, Industrial Code Rule 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing radioactive material(s) for the purpose(s), and at the place(s) designated below. The license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

1. NAME OF LICENSEE	3. LICENSE NUMBER
FEIN 14-1800097 Quality Environmental Solutions and Technologies, Inc. Phone (845) 298-6031	C2939 4. EXPIRATION DATE **June 15, 2026**
2. ADDRESS OF LICENSEE	5a. REFERENCE / b. AMENDMENT NO.
1376 Route 9 Wappingers Falls, New York 12590	**DH 16-1** **DH 16-97** **5**

6. Radioactive Materials (elements in mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
A. Cadmium 109	A. Sealed source	A. 28 millicuries

9. Authorized use.

A. The licensee is authorized to use any sealed source or associated portable x-ray fluorescence device which has been manufactured and distributed in accordance with a specific license issued by an Agreement State or the United States Nuclear Regulatory Commission. Combinations of sources and devices must be compatible for use as stated in a Sealed Source and Device Registration Certificate (i.e., stated in the registration certificate for the source or device).

B. No single source may exceed the maximum activity specified for that nuclide in the Sealed Source and Device Registration Certificate for any device in which the source is to be used.

C. Only portable x-ray fluorescence devices which require continuous activation by the operator, and which incorporate a mechanism to automatically return the source to its shielded position (e.g., a "dead-man" switch) may be obtained and used under this license. Devices which rely upon positive action by the operator to shield the source, such as operation of a key switch, or which do not require continuous operator activation during exposure, are not authorized under this license.

10. A. The Radiation Safety Officer (RSO) for this License is **Rudy Lipinski**.

    B. Licensed material shall be used by, or under the supervision of, the Radiation Safety Officer, by licensee personnel trained and certified by the manufacturer. The licensee shall maintain a complete and accurate record of the qualifications of each person permitted to use radiation sources under this license.

11. Except as specifically provided otherwise in this License, the licensee shall conduct its program in accordance with the statements, representation and procedures contained in the documents, including any enclosures, listed below. The Department's Regulations shall govern, unless the statements, representation and procedures in the licensee's application and correspondence are more restrictive than the Regulations.

    A. License Renewal Application dated March 13, 2006, signed by Vincent R. Lander, with attachments.

    B. License Renewal Request dated March 8, 2016, signed by Suann Lander, with attachments.

12. A. Licensed material shall be stored at the location indicated in Condition 2 and may be used at temporary job sites of the licensee anywhere within the State of New York, where the Department of Health exercises jurisdiction.

    B. Overnight storage at other locations shall be in accordance with statements referenced in Condition 11 of the license, provided that such storage may not be in a residence, or in an attached garage except within a vehicle. Any vehicle used for storage shall be driven only for purposes associated with use or transport of the contained radioactive material, by a person qualified to use the material, and no passengers shall be carried unless they are also involved in work under this license. Vehicular storage shall only be allowed if no other storage is possible and shall not exceed five (5) consecutive nights unless authorization to exceed this limit is obtained from the Department.

    C. Under no circumstances shall radioactive material authorized by this license be transferred to the custody of any person or firm other than the licensee, or be used or stored by another person or firm or its employees; unless that person or firm possesses a valid license to possess and use such radioactive material.

13. Sealed sources containing radioactive materials shall not be opened or removed from devices.

14. A. The licensee is not authorized to dismantle, repair or affect any changes in the source holders/devices.

    B. The licensee shall not alter labels attached to source holders or devices, and shall maintain labels in legible condition at all times.

NEW YORK STATE DEPARTMENT OF HEALTH

RADIOACTIVE MATERIALS LICENSE

3. License Number C2939 **5a. Reference DHs 16-1 & 16-97** **b. Amendment No. 5**

15. The licensee shall instruct persons who engage in work under the license, in accordance with 10 NYCRR 16.13(c). Such instruction shall include the licensee's operating and emergency procedures, and other information contained in documents incorporated in Condition 11.

16. The licensee shall conduct a physical inventory every six (6) months to account for all devices received and possessed under the License. The records of the inventories shall be maintained for three (3) years from the date of the inventory for inspection by the Department, and shall include the quantities and kinds of licensed material, manufacturer's name and model number, location of devices, the date of the inventory, and the name of the person who performed it.

17. A. The licensee shall maintain a utilization log containing the identification of devices used, dates removed and returned to storage, the location of use, and the identity of user.

B. The log shall be kept at the location of storage and shall contain sufficient detail to enable the licensee to inform the Department, at any time, of the exact location of each device.

18. Current copies of the following documents shall be maintained at temporary job sites for Department inspection:

A. The manufacturer's instruction manual and the licensee's operating and emergency procedures.

B. A copy of the results of the latest test for leakage and/or contamination performed on the sealed sources.

C. A copy of this license.

19. In the event that a theft, loss or other serious incident does occur, the Department shall be notified immediately by telephone and subsequent information acquired by the licensee shall be reported as it is received. All device users must carry the NYSDOH's current telephone number in their emergency procedures.

20. The licensee shall ensure that all persons authorized to use portable devices comply with safe use and maintenance procedures and that they do not leave a device unattended or unsecured at any time, even for a few minutes.

FOR THE NEW YORK STATE DEPARTMENT OF HEALTH

Date: JUN 15 2016

By _____

Daniel J. Samson, CHP, Chief
Radioactive Materials Section
Bureau of Environmental Radiation Protection

DJS/NAK:ks

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2023
Issued April 01, 2022

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. PAUL STASCAVAGE
EAS INC - EASTERN ANALYTICAL SERVICES INC
4 WESTCHESTER PLAZA
ELMSFORD, NY 10523-1610

NY Lab Id No: 10851

Is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 7000B

Sample Preparation Methods

	EPA 3050B

Serial No.: 64479

United States Environmental Protection Agency

This is to certify that

Quality Environmental Solutions & Technologies, Inc.

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires November 09, 2024

LBP-119213-2

Certification #

November 09, 2021

Issued On

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Quality Environmental Solutions & Technologies, Inc.

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint renovation, repair, and painting activities pursuant to 40 CFR Part 745.89

In the Jurisdiction of:

All EPA Administered States, Tribes, and Territories

This certification is valid from the date of issuance and expires December 01, 2026

NAT-119213-3

Certification #

November 09, 2021

Issued On

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

NICHOLAS D SALERNO
CLASS(EXPIRES)
C ATEC(06/23) D INSP(06/23)
H PM (06/23)

CERT# 16-10991
DMV# 102522202

MUST BE CARRIED ON ASBESTOS PROJECTS

01213 0064547140

EYES BRO
HAIR BRO
HGT 6' 00"

IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

United States Environmental Protection Agency

This is to certify that

Nicholas D Salerno

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Inspector

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires March 14, 2023

LBP-I-I210690-1

Certification #

February 29, 2020

Issued On

Susan Schulz, Acting Chief

Chemicals and Multimedia Programs Branch

ThermoFisher
SCIENTIFIC

CERTIFICATE

This Certifies that

Nicholas Salerno

Has successfully completed

Safety Training for
~ US Regulations for Handheld XRF Analyzers with Radioactive Sealed Sources

Supervisor Signature

1/22/2021
COMPLETION DATE

Jean Geslin
Jean Geslin, RSO
Thermo Fisher Scientific

ThermoFisher
SCIENTIFIC

CERTIFICATE

This Certifies that

Nicholas Salerno

Has successfully completed

Safety Training for
~ Sealed Source XRF - Radiation Safety~

Supervisor Signature

1/22/2021
COMPLETION DATE

Jean Geslin
Jean Geslin, RSO
Thermo Fisher Scientific

ThermoFisher
SCIENTIFIC

CERTIFICATE

This Certifies that

Nicholas Salerno

Has successfully completed

Safety Training for
~ Transport of Li Ion Batteries ~

Supervisor Signature

1/22/2021
COMPLETION DATE

Jean Geslin
Jean Geslin, RSO
Thermo Fisher Scientific

ThermoFisher
SCIENTIFIC

CERTIFICATE

This Certifies that

Nicholas Salerno

Has successfully completed

Safety Training for
Transport of Radioactive Sealed Sources in XRF Analyzers ~

Supervisor Signature

1/22/2021
COMPLETION DATE

Jean Geslin
Jean Geslin, RSO
Thermo Fisher Scientific

ThermoFisher
SCIENTIFIC

CERTIFICATE

This Certifies that

Nicholas Salerno

Has successfully completed

Safety Training for
~ Radiation Safety for X-ray Tube Based Instruments ~

Supervisor Signature

1/22/2021
COMPLETION DATE

Jean Geslin
Jean Geslin, RSO
Thermo Fisher Scientific

Certificate of Completion

360training.com™

This Certifies That

Nicholas Salerno

is awarded this certificate for

OSHA 10 Hour Outreach Training Program - Construction

Credit Hours: 10.00

Completion Date: 11/01/2018

Curtis Chambers, Trainer C 26-0106073 and G 26-0079775

"As an OSHA authorized trainer, I verify that I have conducted this OSHA outreach training class in accordance with OSHA Outreach Training Program requirements. I will document this class to my authorizing OSHA training organization. Upon successful review of my documentation, I will provide each student their completion card within 90 days of the end of the class."

6801 N Capital of Texas Hwy, Suite 150 ♦ Austin, TX 78731 ♦ 877.881.2235 ♦ www.360training.com

OSHA Occupational Safety and Health Administration

This card acknowledges that the recipient has successfully completed a 10-hour Occupational Safety and Health Training Course in

Construction Safety and Health

NICHOLAS SALERNO

CURTIS CHAMBERS — (Trainer name – print or type)

11/1/2018 — (Course end date)

OSHA recommends Outreach Training Courses as an orientation to occupational safety and health for workers. Participation is voluntary. Workers must receive additional training on specific hazards of their job. This course completion card does not expire.

Use or distribution of this card for fraudulent purposes, including false claims of having received training, may result in prosecution under 18 U.S.C. 1001. Potential penalties include substantial criminal fines, imprisonment up to five years, or both.

For OSHA Outreach Training Program go to "Training" at www.osha.gov

Rev. 9/2009

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

JONATHAN R MAGES
CLASS(EXPIRES)
C ATEC(01/23) D INSP(01/23)
H PM (01/23)

CERT# 18-53364
DMV# 345648492

MUST BE CARRIED ON ASBESTOS PROJECTS

01213 006449101 25

EYES HAZ
HAIR BRO
HGT 5' 10"

IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

OSHA
Occupational Safety and Health Administration

11-006052324

This card acknowledges that the recipient has successfully completed:

10-hour Construction Safety and Health

This card issued to:

Jonathan Mages

Paul Rodriguez
Trainer Name

6/6/2018
Date of Issue

OSHA Training Institute Education Centers
Keene State College

800-449-6742
outreach.keeneosha.com

OSHA recommends Outreach Training Courses as an orientation to occupational safety and health for workers. Participation is voluntary. Workers must receive additional training on specific hazards of their job. This course completion card does not expire.

Use or distribution of this card for fraudulent purposes, including false claims of having received training, may result in prosecution under 18 U.S.C. 1001. Potential penalties include substantial criminal fines, imprisonment up to 5 years, or both.

To verify this training, scan the QR code with your mobile device.

Rev. 1/2016

EQUIVALENCY

It is the intent of these specifications to allow approved equals for all materials specified where brand name, trade name, catalog reference, or patented commodity is referenced. References to such specific commodities are intended as descriptive, not restrictive, unless otherwise stated. Comparable products will be considered if proof of comparability is provided, including appropriate catalog excerpts, descriptive literature, specifications and list data, etc. The District architect/engineer's decision as to the acceptance of the product as equal will be final.

_____
Officer of Company

_____
Date

_____
Company Name

_____
Telephone

_____
Address

North Rockland School District

65 Chapel Street
Garnerville, NY 10923

REFERENCE FORM

All work described shall be performed by an established contractor, which must document its ability to perform the contract in a timely, competent, and acceptable manner. Before the award is made, this contracting firm must submit proof to the Owner's satisfaction that it:

1. Has performed projects of a similar type at a minimum of 3 schools in the past three years.
2. Has been trained by the manufacturer for specific equipment in the proper installation of their equipment.
3. Is not a private residence.
4. Is fully equipped with spare parts and service vehicles to render proper service.
5. Has the ability to fully complete the entire project by the completion date specified elsewhere in the contract specifications.
6. Is able to respond to an emergency in 24 hours or less.

All bidders will be required to complete this form providing three references of past performance. References should involve projects and/or service situations of similar size and scope to bid this. References must have had dealings with the Bidder within the last thirty-six (36) months. The District reserves the right to contact any or all of the references supplied for an evaluation of past performance in order to establish the responsibility of the Bidder before the actual award of the bid and/or contract. Completion of the reference form is required.

BIDDER'S NAME: _____

DATE FILED: _____

OFFICER'S NAME: _____

REFERENCE'S NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

REFERENCE'S NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

REFERENCE'S NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

REFERENCE'S NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

REFERENCE'S NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

REFERENCE'S NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

AIA® Document A305™ – 1986

Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO:

ADDRESS:

SUBMITTED BY:

NAME:

ADDRESS:

PRINCIPAL OFFICE:

[ ] Corporation
[ ] Partnership
[ ] Individual
[ ] Joint Venture
[ ] Other

NAME OF PROJECT: *(if applicable)* S

TYPE OF WORK: *(file separate form for each Classification of Work)*

[ ] General Construction
[ ] HVAC
[ ] Electrical
[ ] Plumbing
[ ] Other: *(Specify)*

§ 1 ORGANIZATION

§ 1.1 How many years has your organization been in business as a Contractor?

§ 1.2 How many years has your organization been in business under its present business name?

§ 1.2.1 Under what other or former names has your organization operated?

§ 1.3 If your organization is a corporation, answer the following:

§ 1.3.1 Date of incorporation:
§ 1.3.2 State of incorporation:
§ 1.3.3 President's name:

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.

§ 1.3.4 Vice-president's name(s)

§ 1.3.5 Secretary's name:
§ 1.3.6 Treasurer's name:

§ 1.4 If your organization is a partnership, answer the following:
§ 1.4.1 Date of organization:
§ 1.4.2 Type of partnership (if applicable):
§ 1.4.3 Name(s) of general partner(s)

§ 1.5 If your organization is individually owned, answer the following:
§ 1.5.1 Date of organization:
§ 1.5.2 Name of owner:

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

§ 2 LICENSING

§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

§ 3 EXPERIENCE

§ 3.1 List the categories of work that your organization normally performs with its own forces.

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)
§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

§ 4 REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

§ 4.3.2 Name and address of agent:

§ 5 FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

§ 6 SIGNATURE

§ 6.1 Dated at this day of

Name of Organization:

By:

Title:

§ 6.2

M being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this day of

Notary Public:

My Commission Expires:

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

Sample

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution
For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION
§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS
§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
.3 AIA Document A201™–2017, General Conditions of the Contract for Construction
.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

Additions and Deletions Report for

AIA® Document A101™ – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 15:01:06 on 12/22/2017.

PAGE 1

Sample

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Michael Shilale, AIA, LEED, CPHC, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 15:01:06 on 12/22/2017 under Order No. 1200144258 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ - 2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

AIA® Document A101™ – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the day of in the year
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

Sample

THE OWNER:
(Name, legal status and address)

THE CONTRACTOR:
(Name, legal status and address)

TABLE OF ARTICLES

ADDITIONS AND DELETIONS:
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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.
(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to

the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

[ ] § A.2.4.1 **Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

[ ] § A.2.4.2 **Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

[ ] § A.2.4.3 **Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

[ ] § A.2.4.4 **Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

[ ] § A.2.4.5 **Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

[ ] § A.2.4.6 **Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

[ ] § A.2.4.7 **Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[ ] § A.2.5.1 **Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

[ ] § A.2.5.2 Other Insurance

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than ($) each occurrence, ($) general aggregate, and ($) aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal injury and advertising injury;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; and

.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

.1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

.2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.

.3 Claims for bodily injury other than to employees of the insured.

.4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.

.5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.

.6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.

.7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.

.8 Claims related to roofing, if the Work involves roofing.

.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

.10 Claims related to earth subsidence or movement, where the Work involves such hazards.

.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than ($) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than ($) each accident, ($) each employee, and ($) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than ($) per claim and ($) in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[ ] **§ A.3.3.2.1** Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

[ ] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than ($) per claim and ($) in the aggregate, for Work within fifty (50) feet of railroad property.

[ ] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than ($) per claim and ($) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[ ] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

[ ] **§ A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

[ ] **§ A.3.3.2.6 Other Insurance**

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)

Type	Penal Sum ($0.00)
Payment Bond	
Performance Bond	

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

Additions and Deletions Report for

AIA® Document A101™ – 2017 Exhibit A

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 13:04:02 ET on 09/27/2019.

PAGE 1

Sample

RIDER Attached to AIA Document A101 -2017 Exhibit A - Regarding Insurance Requirements

1. Organizations coverage shall be primary and non-contributory coverage for the District/BOCES, its Board, employees and volunteers.
2. Additional insured status shall be provided by standard or other endorsements that extend coverage to the District/BOCES for on-going operations (CG 20 38) and products and completed operations (CG 20 37). The decision to accept an endorsement rest solely with the District/BOCES. A completed copy of the endorsements must be attached to the Certificate of Insurance.
    a. The certificate of insurance must describe the services provided by the contractor (e.g., roofing, carpentry or plumbing) that are covered by the liability policies.
3. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form– additional details must be provided in writing.
4. Add Under General Liability Coverage:
    a. $100,000 Fire Damage
    b. $10,000 Medical Expense
5. Umbrella/Excess and OCP requirements:
    a. $1 million/ occurrence, $2 million/ aggregate with the District/BOCES as the Named Insured for projects less than or equal to $1,000,000 and work on 1 Story (10 feet) only.
    b. $2 million/ occurrence, $4 million/ aggregate with the District/BOCES as the Named Insured for projects greater than $1,000,000 and work over 1 story (10 feet).
    c. $2 million/ occurrence, $4 million/ aggregate with the District/BOCES as the named Insured for all projects where General Liability, Auto and Umbrella/Excess Coverage is with non-licensed and non-admitted carriers in New York State.
    d. The District/BOCES will be the Named Insured on OCP Policies. There will be no Additional Insureds on any OCP Policies.
6. Umbrella/Excess Insurance:
    a. $5 million each Occurrence and Aggregate for General Construction and no work at elevation (1 story or 10 feet) or project values less than or equal to $1,000,000.
    b. $10 million each Occurrence and Aggregate for high risk construction, work at elevation (greater than 1 story or 10 feet) or project values greater than $1,000,000.

OWNER
North Rockland Central School District

CONTRACTOR

By: _____

By: _____

AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Sample

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: None See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Sample

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
S

THE OWNER:
(Name and address)

THE ARCHITECT:
(Name and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

Init.
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INDEX
(Numbers and Topics in Bold are Section Headings)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the

portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and

completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the

Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount

for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or

encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work to comply with the requirements of the Contract Documents; or

.3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment

property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by

such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

Additions and Deletions Report for

AIA® Document A201™ – 2007

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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SECTION 008100 - MODIFICATIONS TO GENERAL CONDITIONS

GENERAL

A. AIA Document A201, 2017 Edition, "General Conditions of the Contract for Construction", shall be considered an incorporated portion of Contract, and it's provisions, unless specifically indicated to be omitted, shall determine all questions which may arise concerning adjudication of disputes or other matters covered therein having relation to Contracts between Owner and Contractor.

B. Where any Article of AIA Document A201, 2017 Edition, is modified by alteration, addition or deletion, provisions of such Article shall remain in effect. All modifications shall be considered as added thereto. Where any such Article is amended, voided or superseded thereby, provisions of such Article not so specifically amended, voided or superseded shall remain in effect. Wherever a conflict exists between the Modifications to the General Conditions and any article of AIA Document 201, 2017, the provision of these Modifications shall prevail.

C. Where provisions of "General Conditions of the Contract for Construction" relate to Project administrative or work-related requirements of the Contract, those provisions (including, but not limited to, allowances, progress schedule, submittal procedure, temporary facilities, cutting and patching, record drawings and clean-up) are specified in Division 1-General Requirements if required.

ARTICLE 1 - GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

(A) “Owner” (Article 2, General Conditions)

(B) "Architect" (Article 2, General Conditions) is Michael Shilale Architects, LLP, 140 Park Ave., New City, NY 10956.

(c) "General Contractor, (Article 3, General Conditions) is contractor having direct contract with Owner.

(d) "Contractor" (Article 3, General Conditions) is either General Contractor or Subcontractor having direct contract with General Contractor.

(e) "Other Contractor" is contractor having contract with Owner for work not herein specified.

(f) The Contractor shall allow the Owner or anyone employed by him, directly or indirectly, whether Union or non-Union, in the building and on the premises at all times.

(g) The term "Furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

(h) The term "Install" is used to describe operations at Project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".

A. Add the following sentence to Subparagraph 1.1.1:

a. The Contract Documents executed or identified in accordance with Subparagraph 1.5.1 shall prevail in case of an inconsistency with subsequent versions made through manipulated electronic operations involving computers.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

A. Add clause 1.2.1.1 to Subparagraph 1.2.1:
1.2.1.1 In the event of conflicts or discrepancies among the contract documents, interpretations will be based on the following priorities:

1. Modifications
2. The Agreement
3. Addenda, with those of later date having precedence over those of an earlier date.
4. The supplementary conditions.
5. The General Conditions of contract for construction.
6. Division 1 of the specifications.
7. Drawings and divisions 2-33 of the specifications.
8. Other documents specifically enumerated in the agreements as part of the contract documents.

In the case of conflicts or discrepancies between drawings and divisions 2-33 of the specifications or within either document not clarified by addendum, the Architect will determine which takes precedence in accordance with Subparagraph 4.2.11, 4.2.12, and 4.2.13.

B. Add the following clause to section 1.7 :
PDF files may be provided to contractor.

C. Delete section 1.8 and substitute to following:
Building Information Models will not be provided.

ARTICLE 2 - OWNER

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

A. Delete Subparagraph 2.3.6 and substitute the following:
2.3.6 The Contractor will be furnished, free of charge two (2) copies of drawings and Project manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3 - CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

A. Add the following Subparagraph 3.2.5 to section 3.2:
3.2.5 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents to where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

3.4 LABOR AND MATERIALS

A. Add section 3.4.2.1 to section 3.4.2:
3.4.2.1 After the Contract has been executed, the Owner and Architect will consider requests for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:

1. represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
2. represents that it will provide the same warranty for the substitution as it would have provided for the product specified.
3. certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent; and
4. shall coordinate the installation of the accepted substitute, making such changes as may be required for the

Work to be complete in all respects.

B. Add the following to the end of section 3.4.2:
3.4.2.2 The Owner shall be entitled to reimbursement from the contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications resulting from such substitutions.

3.6 TAXES

A. Owner corporation is a School District, therefore exempt from sales tax.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

A. Add subparagraph 3.11.1 as follows: "For additional requirements refer to Specification Section 017839 - PROJECT RECORD DOCUMENTS. Reference to 3.11 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Add section 3.12.11 to section 3.12:
3.12.11 The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.

B. Add section 3.12.12 to section 3.12:
3.12.12 "For additional requirements refer to Specification Section 013300 – SUBMITTAL PROCEDURES. Reference to 3.12 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

3.14 CUTTING AND PATCHING

A. Add subparagraph 3.14.3 as follows: "For additional requirements refer to Specification Section 024119 – SELECTIVE DEMOLITION. Reference to 3.14 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

3.15 CLEANING UP

A. Add subparagraph 3.15.3 as follows: "For additional requirements refer to Specification Section 017419 - CONSTRUCTION WASTE MANAGEMENT and 017700 – CLOSEOUT PROCEDURES. Reference to 3.15 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

A. Add the following subparagraph 4.2.2.1:
4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor or by defects and deficiencies in the Work.

B. Add the following subparagraph 4.2.14.1:
4.2.14.1 Contractor's requests for information shall be prepared and submitted in accordance with Division

1 "General Requirements" sections on the form included in the Contract Documents [OR] on AIA Document G716-2004. The Architect will return without action requests for information that do not conform to requirements for the Contract Documents.

ARTICLE 5 - SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTORS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

A. Add section 5.2.5 to section 5.2:

5.2.5 MANUFACTURERS AND FABRICATORS

5.2.5.1 Not later than thirty (30) days after the date of commencement of the Work, the Contractor shall furnish in writing to the Owner through the Architect the names of the persons or entities proposed as manufactures or fabricators for certain products, equipment and systems identified in the General Requirements (Division 1 of the Specifications) and, where applicable, the name of the installing Subcontractor. The Architect may reply within 14 days to the Contractor in writing stating 1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or 2) that the Architect requires additional time to review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

5.2.5.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.2.5.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected manufacturer or fabricator was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute manufacturer's or fabricator's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.5.4 The Contractor shall not substitute a person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

ARTICLE 7 - CHANGES IN THE WORK

7.1 GENERAL

A. Add the following Subparagraph 7.1.4 to Paragraph 7.1:
7.1.4 The combined overhead and profit included in the total cost to the Owner of a change in the work shall be based on the following schedule:

1. For the Contractor, for Work performed by the Contractor's own forces, 15 percent of the cost.
2. For the Contractor, for Work performed by the Contractor's Subcontractor 7 percent of the amount due to the Subcontractor.
3. For each Subcontractor involved, for work performed by that subcontractor's own forces, 7 percent of the cost.
4. for each Subcontractor, for Work performed by the Subcontractor's sub-subcontractor, 7 percent of the amount due the sub-subcontractor.
5. Cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.7.
6. In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and Materials shall be itemized in the manner

prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving over $500.00 be approved without such itemization.

7.2 CHANGE ORDERS

A. Delete Subparagraph 7.2.1 and substitute as follows:

7.2.1 A Change Order is a written instrument prepared by the Contractor and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

ARTICLE 8 - TIME

8.1.4 A. Delete Subparagraph 8.1.4 and substitute the following:

8.1.4 The term "day" as used in the Contract Documents shall mean working day, excluding weekends and legal holidays.

8.3 DELAYS AND EXTENSIONS OF TIME

Delete paragraph 8.3.1 and substitute as follows:

"8.3.1 If the Contractor is delayed at any time in the progress of the work by such causes which the Architect determines justifies the delay, the Contract time shall be extended by Change Order for such reasonable time as the Architect may determine. The Contractor agrees to make no claim against the Owner or the Architect, Architect's Consultants or Architect's Subcontractors, for damages for delay in the performance of this contract occasioned by any act or omission of the Owner or any of its representatives, or the Architect, Architect's Consultants or Architect's Subcontractors, and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the work as provided herein. The delays contemplated by this paragraph include, but are not limited to, loss or damage arising out of, or related to, any unforeseen obstructions or difficulties which may be encountered during the performance of the contract, including damages which may be caused or occasioned by the contractor's reliance upon such records, reports or information furnished by the Owner or Architect or Architect's Consultants or Architect's Subcontractors. An extension of time to complete performance is an equitable adjustment as contemplated by paragraph 14.3.2 of the General Conditions of the contract. When the act or omission of another contractor causes delays resulting in damage to the Contractor, the Contractor damaged thereby must proceed against the offending contractor and shall make no claim against the Owner, or Architect or Architect's Consultants or Architect's Subcontractors."

8.3.2 Delete in its entirety.

8.3.3 Delete the words "either party" in line 2 and replace with the words "the Owner."

ARTICLE 9 - PAYMENT AND COMPLETION

9.3 APPLICATION FOR PAYMENTS

A. 9.3.1 Add the following sentence to Subparagraph 9.3.1:

The form of Application for Payment, duly notarized, shall be current authorized edition of AIA Document G702-1992, Application and Certificate for Payment, supported by a current authorized edition of AIA Document G703-1992, Continuation Sheet.

B. Add the following clause 9.3.1.3 to Subparagraph 9.3.1:

9.3.1.3 Until the work is ninety (90%) percent complete, the Owner shall pay ninety (90%) percent of the amount due the Contractor on the account of progress payments. At the time of Work is 90 percent complete and thereafter, the Owner shall pay ninety-five (95%) percent of the amount due to the Contractor until punch

list completion, subject however to the provisions of Article 5 of AIA Document A101-1997.

9.6 To subparagraph 9.6.1 add the following

A. "Certificates for Payment shall be issued monthly if work is progressing satisfactorily and if application for payment has been submitted

B. To subparagraph 9.6.2 add the following: "Within fifteen (15) calendar days the receipt of a payment from the Owner, the Contractor shall pay each of his subcontractors and materials men for Worked performed and/or materials furnished by them as reflected in the payment from the Owner, less an amount necessary to satisfy any outstanding claims, liens or judgments and less a retained amount of not more than 5%, except that the Contractor may retain not more than 10% provided that prior to entering into a Subcontract with the Contractor, the subcontractor is unable or unwilling to provide a performance bond and labor and material bond both in the full amount of the Subcontract at the request of the Contractor. The Contractor shall not retain portions of the proceeds owed the Subcontractor and/or material man from the Owner's payment to the Contractor for the "Contract Balance". Similar provisions apply to the Subcontractor and/or material man paying each of his subcontractors and material men. Nothing in the law creates any obligation on the part of the Owner to pay, or to see the payment of, Subcontractor or material man from a contractor, nor creates any relationship in contract or otherwise, implied or expressed, between Subcontractor and material man and the owner."

9.8 SUBSTANTIAL COMPLETION

A. Add section 9.8.3.1 after 9.8.3
9.8.3.1 The Architect will perform no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

B. Add to section 9.8.5 ,In no event shall the outstanding amount be less than two hundred (200%) percent of the value of the incomplete Work and unsettled claims.

9.10 FINAL COMPLETION AND FINAL PAYMENT

A. Add the following section 9.10.1.1 to section 9.10.1:
9.10.1.1 The Architect will perform no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

B. To subparagraph 9.10.2 add the following: "Upon demand by the Owner, Contractor shall provide and file bond for discharge of any lien, as required by Lien Law, State of New York, Section 21, Paragraph 5."

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

A. No Modifications

ARTICLE 11 - INSURANCE AND BONDS

A. Article 11 Insurance and Bonds immediately follows Exhibit A to AIA Document A101 2017.

ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK

A. No Modificationg

ARTICLE 15 – CLAIMS AND DISPUTES

A. Add the following Sections 15.1.6.3 and 15.1.6.4 to Section 15.1.6:

15.1.6.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indication all the activities affected by the circumstances forming the basis of the Claim.

15.1.6.4. The Contractor shall not be entitled to a separate increase in the Contact Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGE

A. Add the following sentence to Section 15.1.6:
If, before expiration of 30 days from the date of execution for this Agreement, the Owner obtains by separate agreement and furnishes to the Contractor a similar mutual waiver of all claims from the Architect against the Contractor for consequential damages which the Architect may incur as a result of any act or omission of the Owner or Contractor, then the waiver of consequential damages by the Owner and Contractor contained in this Section 15.1.6 shall be applicable to claims by the Contractor against the Architect.

END OF SECTION 008100

SECTION 008150 - UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE PROJECTS

1.01

"The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy."

1.02 Indication that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and asbestos. Note, the project folder should contain a letter regarding the presence of asbestos.

1.03:

"General safety and security standards for construction projects.

(1) All construction materials shall be stored in a safe and secure manner.

(2) Fences around construction supplies or debris shall be maintained.

(3) Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.

(4) During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.

(5) Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites."

1.04

"Separation of construction areas from occupied spaces. Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

(1) A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.

(2) Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.

(3) All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session."

1.05 A plan detailing how exiting required by the applicable building code will be maintained work for this project will be completed while school not in session.

1.06 A plan detailing how adequate ventilation will be maintained during construction work for this project will be completed while school is not in session.

1.07:

"Construction and maintenance operations shall not produce noise in excess of 60 d.b.a. in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken."

1.08:

"The contractor shall be responsible for the control of chemical fumes, gases, and other contaminates produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes."

1.09:

"The contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured or ventilated in accordance with manufacturers recommendations before a space can be occupied."

1.10:

"Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied". Note, It is our interpretation that the term "building", as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non combustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion and ventilation systems must be physically separated and sealed at the isolation barrier.

Exterior work such as roofing, flashing, siding, or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.

1.11 Surfaces that will be disturbed by reconstruction must have a determination made as to the presence of lead. Projects which disturb surfaces that contain lead shall have in the specifications a plan prepared by a certified Lead Risk Assessor or Supervisor which details provisions for occupant protection, worksite preparation, work methods, cleaning and clearance testing which are in general accordance with the HUD Guidelines.

WAGE RATE REQUIREMENTS

1. As required by Wickes Law, all contractors and sub-contractors on construction work must pay wages that are equal to, or greater than, the prevailing wage rates determined by the federal government. A copy of the said rates is attached to the specifications herein. Contractors and sub-contractors will be required to submit weekly payroll records certifying actual wages paid.

Kathy Hochul, Governor

Roberta Reardon, Commissioner

North Rockland Central School

John Cirilli, AIA, Partner
140 Park Avenue
New City NY 10956

Schedule Year	2022 through 2023
Date Requested	10/31/2022
PRC#	2022012255

Location	North Rockland High School
Project ID#	42051
Project Type	Demo of existing press box, construction of new press box/concession stand, replacement of RTUs, exterior and interior improvements of existing field house

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2022 through June 2023. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission: a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion online.

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the "Request for a dispensation to work overtime" form (PW30) and "4 Day / 10 Hour Work Schedule" form (PW 30.1).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemperaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid

or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment.Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed $100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds $25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of $50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.

North Rockland Central School

John Cirilli, AIA, Partner
140 Park Avenue
New City NY 10956

Schedule Year	2022 through 2023
Date Requested	10/31/2022
PRC#	2022012255

Location	North Rockland High School
Project ID#	42051
Project Type	Demo of existing press box, construction of new press box/concession stand, replacement of RTUs, exterior and interior improvements of existing field house

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information
All information must be supplied

Federal Employer Identification Number: _____

Name: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Amount of Contract: $_____

Approximate Starting Date: ____/____/____

Approximate Completion Date: ____/____/____

Contract Type:

[ ] (01) General Construction
[ ] (02) Heating/Ventilation
[ ] (03) Electrical
[ ] (04) Plumbing
[ ] (05) Other : _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to $1,500 for a first offense and up to $5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, https://dol.ny.gov/public-work-and-prevailing-wage
If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.ny.gov* or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

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1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

NEW YORK STATE OF OPPORTUNITY. Department of Labor

Required Notice under Article 25-B of the Labor Law

Attention All Employees, Contractors and Subcontractors: You are Covered by the Construction Industry Fair Play Act

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor**, you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

• **Civil Penalty**	First offense: Up to $2,500 per employee Subsequent offense(s): Up to $5,000 per employee
• **Criminal Penalty**	First offense: Misdemeanor - up to 30 days in jail, up to a $25,000 fine and debarment from performing public work for up to one year. Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a $50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

IA 999 (09/16)

New York State Department of Labor
Bureau of Public Work

Attention Employees

THIS IS A:

PUBLIC WORK PROJECT

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at:

https://dol.ny.gov/public-work-and-prevailing-wage

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is $250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training “prior to the performing any work on the project.”

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.)*
- Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is $3 million in Bronx, Kings, New York, Queens and, Richmond counties; $1.5 million in Nassau, Suffolk and Westchester counties; and $500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirement s on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less that six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Rockland County General Construction

Boilermaker — 10/01/2022

JOB DESCRIPTION Boilermaker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2022
Boilermaker	$ 63.38
Repairs & Renovations	63.38

SUPPLEMENTAL BENEFITS
Per Hour:

Boilermaker	32% of hourly Wage Paid
Repair $ Renovations	Wage Paid + $ 25.38

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

OVERTIME PAY
See (D, O) on OVERTIME PAGE
Repairs & Renovation see (B,E,Q)

HOLIDAY
Paid: See (8, 16, 23, 24) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 12, 15, 16, 22, 23, 24, 25) on HOLIDAY PAGE
NOTE: *Employee must work in pay week to receive Holiday Pay.
**Employee gets 4 times the hourly wage rate for working Labor Day.

REGISTERED APPRENTICES
Wage per hour:
(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

Apprentice(s)	32% of Hourly Wage Paid Plus Amount Below
1st Term	$ 19.41
2nd Term	20.26
3rd Term	21.11
4th Term	21.96
5th Term	22.82
6th Term	23.68
7th Term	24.52

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter — 10/01/2022

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2022
Piledriver	$ 58.16 + 9.54*

Dockbuilder $ 58.16
+ 9.54*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 44.54

OVERTIME PAY
See (B, E2, O) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.
Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wages per hour
(1)year terms:

1st	2nd	3rd	4th
$24.60 + 5.05*	$30.20 + 5.05*	$38.58 + 5.05*	$46.97 + 5.05*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All Terms: $ 31.03

8-1556 Db

Carpenter — 10/01/2022

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per hour: 07/01/2022

Carpet/Resilient
Floor Coverer $ 55.05
+ 8.25*

*This portion is not subject to overtime premiums

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS
Per hour:
$ 39.40

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.
Apprentices See (5,6,11,13,16,18,19,25)
Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wage per hour - (1) year terms:

1st	2nd	3rd	4th
$ 24.80 + 1.85*	$ 27.80 + 2.35*	$ 32.05 + 2.85*	$ 39.93 + 3.85*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 14.80	$ 15.80	$ 18.90	$ 19.90

8-2287

Carpenter — 10/01/2022

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per Hour: 07/01/2022

Marine Construction:

Marine Diver	$ 73.03
	+ 9.54*
Marine Tender	$ 62.11
	+ 9.54*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyworker	$ 44.54

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (18, 19) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 11, 13, 16, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year terms.

1st year	$ 24.60
	+ 5.05*
2nd year	30.20
	+ 5.05*
3rd year	38.58
	+ 5.05*
4th year	56.97
	+ 5.05*

*This portion is not subject to overtime premiums

Supplemental Benefits
Per Hour:

All terms	$ 31.03

8-1456MC

Carpenter — 10/01/2022

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per hour: 07/01/2022

Building	
Millwright	$ 57.80
	+ 12.62*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS
Per hour:

Millwright	$ 43.16

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (18,19) on HOLIDAY PAGE.

Overtime See (5,6,8,11,13,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wages per hour:
One (1) year terms:

1st.	2nd.	3rd.	4th.
$31.24	$36.69	$42.14	$53.04
+ 6.75*	+ 7.92*	+ 9.09*	+ 11.43*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:
One (1) year terms:

1st.	2nd.	3rd.	4th.
$29.01	$31.54	$34.72	$39.14

8-740.1

Carpenter — 10/01/2022

JOB DESCRIPTION Carpenter **DISTRICT** 8

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

PARTIAL COUNTIES
Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.
Putnam: South of but including the following, Cold Spring, TompkinsCorner, Mahopac, Croton Falls, east to Connecticut border.
Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES

Per hour:	07/01/2022	10/18/2022
Core Drilling:		
Driller	$ 42.27	$ 43.38
	+ 2.30*	+ 2.50*
Driller Helper	33.47	34.47
	+ 2.30*	+ 2.50*

Note: Hazardous Waste Pay Differential:
For Level C, an additional 15% above wage rate per hour
For Level B, an additional 15% above wage rate per hour
For Level A, an additional 15% above wage rate per hour
Note: When required to work on water: an additional $ 3.00 per hour.

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS
Per hour:

Driller and Helper	$ 28.30	$ 28.85

OVERTIME PAY
See (B, G, P) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

8-1536-CoreDriller

Carpenter - Building / Heavy&Highway — 10/01/2022

JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

WAGES
WAGES:(per hour)
Applies to CAPRENTER BUILDING/HEAVY & HIGHWAY/TUNNEL:

	07/01/2022	07/01/2023 Additional	07/01/2024 Additional	07/01/2025 Additional
Base Wage	$ 38.95 +$6.65*	$ 1.25**	$ 1.25**	$ 1.25**

*For all hours paid straight or premium.
**To be allocated at a later date.

SHIFT DIFFERENTIAL: When it is mandated by a Government Agency irregular or off shift can be worked. The Carpenter shall receive an additional fifteen percent (15%) of wage plus applicable benefits.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 32.88

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
BUILDING:
Paid: See (1) on HOLIDAY PAGE.
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.
- Holidays that fall on Sunday will be observed Monday.

HEAVY&HIGHWAY/TUNNEL:
Paid: See (5, 6, 25) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
- Holidays that fall on Sunday will be observed Monday
- Must be employed during the five (5) work days immediately preceding a holiday or during the five (5) work days following the paid holiday to receive holiday pay
- If Employee is entitled to a paid holiday, the Employee is paid the Holiday wage and supplemental benefits whether they work or not. If Employee works the Holiday, the Employee will receive holiday pay (including supplemental benefits), plus the applicable premium wage for working the Holiday. If Employee works in excess of 8 hours on Holiday, then benefits will be paid for any hours in excess of 8 hours.

REGISTERED APPRENTICES
1 year terms at the following wage rates:

1st	2nd	3rd	4th	5th
$ 19.48 +3.57*	$ 23.37 +3.57*	$ 25.32 +3.57*	$ 27.27 +3.57*	$ 31.16 +3.57*

*For all hours paid straight or premium

SUPPLEMENTAL BENEFITS per hour:

All terms	$ 16.28

11-279.1B/HH

Electrician — 10/01/2022

JOB DESCRIPTION Electrician **DISTRICT** 11

ENTIRE COUNTIES
Orange, Putnam, Rockland

PARTIAL COUNTIES
Dutchess: Towns of Fishkill, East Fishkill, and Beacon.

WAGES
Per hour:

	07/01/2022	04/01/2023	04/01/2024
Electrician Wireman/Technician	$ 48.00	$ 49.50	$ 50.50

	+9.00*	+ 9.00*	+ 9.50*

SHIFT DIFFERENTIAL: On Public Work in New York State when shift work is mandated either in the job specifications or by the contracting agency, the following rates apply when shift is worked:

Between 4:30pm & 12:30am	$ 56.32	$ 58.08	$ 59.30
	+ 9.00*	+ 9.00*	+ 9.50*
Between 12:30am & 8:30am	$ 63.09	$65.06	$66.35
	+ 9.00*	+ 9.00*	+ 9.50*

*For all hours paid straight or premium, not to be included in 3% calculation for supplemental benefits.

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (subject to overtime premiums):
- On jobs where employees are required to work from boatswain chairs, swinging scaffolds, etc., forty (40) feet or more above the ground, or under compressed air, using Scottair packs, or gas masks, they shall receive an additional $2.00 per hour above the regular straight time rate.
- Journeyman Wireman working in Shafts, Tunnels or on Barges: $5.00 above the Journeyman Wireman rate of pay
- Journeyman Wireman when performing welding or cable splicing: $3.00 above the Journeyman Wireman rate of pay
- Journeyman Wireman required to have a NYS Asbestos Certificate: $3.00 above the Journeyman Wireman rate of pay
- Journeyman Wireman required to have a CDL: $3.00 above the Journeyman Wireman rate of pay.

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2022	04/01/2023	04/01/2024
Journeyman	$ 27.68 plus 3% of straight or premium wage	$ 28.68 plus 3% of straight or premium wage	$ 29.68 plus 3% of straight or premium wage

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 13, 15, 16, 25) on HOLIDAY PAGE
When the holiday falls on a Saturday it is observed the Friday before. When the holiday falls on a Sunday it is observed on the Monday after.

REGISTERED APPRENTICES
WAGES:
(1)year terms at the following rates

07/01/2022	1st	2nd	3rd	4th	5th	6th
1st Shift	$ 13.80	$ 18.40	$ 23.00	$ 27.60	$ 32.20	$ 34.50
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*
2nd Shift	16.19	21.59	26.99	32.38	37.78	40.48
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*
3rd Shift	18.14	24.18	30.23	36.28	42.32	45.35
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*

04/01/2023	1st	2nd	3rd	4th	5th	6th
1st Shift	$ 14.25	$ 19.00	$ 23.75	$ 28.50	$ 33.25	$ 35.63
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*
2nd Shift	16.72	22.29	27.87	33.44	39.01	41.80
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*
3rd Shift	18.73	24.97	31.22	37.46	43.70	46.83
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*

04/01/2024	1st	2nd	3rd	4th	5th	6th
1st Shift	$ 14.55	$ 19.40	$ 24.25	$ 29.10	$ 33.95	$ 36.38
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*
2nd Shift	17.08	22.77	28.47	34.16	39.85	42.70
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*
3rd Shift	19.12	25.49	31.87	38.24	44.61	47.80
	+1.00*	+1.00*	+1.50*	+2.00*	+2.50*	+2.50*

09/01/2024	1st	2nd	3rd	4th	5th	6th
1st Shift	$ 14.55	$ 19.40	$ 24.25	$ 29.10	$ 33.95	$ 36.38
	+0.50*	+1.00*	+1.00*	+2.00*	+2.50*	+2.50*
2nd Shift	17.08	22.77	28.47	34.16	39.85	42.70
	+0.50*	+1.00*	+1.00*	+2.00*	+2.50*	+2.50*
3rd Shift	19.12	25.49	31.87	38.24	44.61	47.80
	+0.50*	+1.00*	+1.00*	+2.00*	+2.50*	+2.50*

*For all hours paid straight or premium, not to be included in 3% calculation for supplemental benefits.

SUPPLEMENTAL BENEFITS per hour:

07/01/2022	
1st term	$ 15.31 plus 3% of straight or premium wage
2nd term	$ 15.81 plus 3% of straight or premium wage
3rd term	$ 17.31 plus 3% of straight or premium wage
4th term	$ 18.31 plus 3% of straight or premium wage
5th term	$ 19.81 plus 3% of straight or premium wage
6th term	$ 19.81 plus 3% of straight or premium wage
09/01/2022	
1st term	$ 16.28 plus 3% of straight or premium wage
2nd term	$ 16.28 plus 3% of straight or premium wage
3rd term	$ 18.28 plus 3% of straight or premium wage
4th term	$ 18.78 plus 3% of straight or premium wage
5th term	$ 20.28 plus 3% of straight or premium wage
6th term	$ 20.28 plus 3% of straight or premium wage
09/01/2024	
1st term	$ 16.28 plus 3% of straight or premium wage
2nd term	$ 17.78 plus 3% of straight or premium wage
3rd term	$ 18.78 plus 3% of straight or premium wage
4th term	$ 19.78 plus 3% of straight or premium wage
5th term	$ 21.28 plus 3% of straight or premium wage
6th term	$ 21.28 plus 3% of straight or premium wage

11-363/1

Elevator Constructor — 10/01/2022

JOB DESCRIPTION Elevator Constructor **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

PARTIAL COUNTIES
Rockland: Entire County except for the Township of Stony Point
Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES
Per hour:

	07/01/2022	03/17/2023
Elevator Constructor	$ 75.14	$ 77.49
Modernization & Service/Repair	59.09	60.89

Four(4), ten(10) hour days may be worked at straight time during a week, Monday thru Friday.

NOTE- In order to use the '4 Day/10 Hour Work Schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 IS NOT SUBMITTED you will be liable for overtime payments for work over the allotted hours per day listed.

SUPPLEMENTAL BENEFITS
Per Hour:

Elevator Constructor	$ 43.914	$ 45.574
Modernization & Service/Repairs	42.787	44.412

OVERTIME PAY
Constructor See (D, M, T) on OVERTIME PAGE.

Modern/Service See (B, F, S) on OVERTIME PAGE.

HOLIDAY
Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:
*Note:1st, 2nd, 3rd Terms are based on Average wage of Constructor & Modernization.
Terms 4 thru 9 Based on Journeyman's wage of classification Working in.

6 MONTH TERMS:

1st Term*	2nd & 3rd Term*	4th & 5th Term	6th & 7th Term	8th & 9th Term
50%	50%	55%	65%	75%

SUPPLEMENTAL BENEFITS

Elevator Constructor		
1st Term	$ 0.00	$ 0.00
2nd & 3rd Term	34.772	36.024
4th & 5th Term	35.606	36.943
6th & 7th Term	37.052	38.448
8th & 9th Term	38.497	39.953

Modernization & Service/Repair		
1st Term	$ 0.00	$ 0.00
2nd & 3rd Term	34.672	35.694
4th & 5th Term	35.195	36.525
6th & 7th Term	36.571	37.948
8th & 9th Term	37.938	39.38

4-1

Elevator Constructor — 10/01/2022

JOB DESCRIPTION Elevator Constructor **DISTRICT** 1

ENTIRE COUNTIES
Columbia, Dutchess, Greene, Orange, Putnam, Sullivan, Ulster

PARTIAL COUNTIES
Delaware: Towns of Andes, Bovina, Colchester, Davenport, Delhi, Harpersfield, Hemdon, Kortright, Meredith, Middletown, Roxbury, Hancock & Stamford
Rockland: Only the Township of Stony Point.
Westchester: Only the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per Hour	07/01/2022	01/01/2023
Mechanic	$ 64.63	$ 67.35
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

Four (4), ten (10) hour days may be worked for New Construction and Modernization Work at straight time during a week, Monday thru Thursday or Tuesday thru Friday.

***Four (4), ten (10) hour days are not permitted for Contract Work/Repair Work

NOTE - In order to use the '4 Day/10 Hour Work Schedule' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule', form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour

	07/01/2022	01/01/2023
Journeyperson/Helper	$ 36.885*	$ 37.335*

(*)Plus 6% of regular hourly if less than 5 years of service. Plus 8% of regular hourly rate if more than 5 years of service.

OVERTIME PAY
See (D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

Note: When a paid holiday falls on Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES

Wages per hour:

0-6 mo*	6-12 mo	2nd yr	3rd yr	4th yr
50 %	55 %	65 %	70 %	80 %

(*)Plus 6% of the hourly rate, no additional supplemental benefits.

Supplemental Benefits per hour worked:

Same as Journeyperson/Helper

1-138

Glazier — 10/01/2022

JOB DESCRIPTION Glazier **DISTRICT** 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per hour:	7/01/2022	11/01/2022 Additional
Glazier	$ 59.59	$ 1.25
*Scaffolding	61.55	
Glass Tinting & Window Film	30.11	
**Repair & Maintenance	30.11	

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 24' or more, but not pipe scaffolding.

**Repair & Maintenance- All repair & maintenance work on a particular building whenever performed, where the total cumulative contract value is under $148,837. All Glass tinting, window film, regardless of material or intended use, and all affixing of decals to windows or glass.

SUPPLEMENTAL BENEFITS

Per hour:	7/01/2022
Journeyworker	$ 37.55
Glass tinting & Window Film	22.01
Repair & Maintenance	22.01

OVERTIME PAY

See (B,H,V) on OVERTIME PAGE.
For 'Repair & Maintenance' and 'Glass Tinting & Window Film' see (B, B2, I, S) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE
For 'Repair & Maintenance' and 'Glass Tinting & Window Film' Only
Paid: See(5, 6, 16, 25)
Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES

Wage per hour:
(1) year terms at the following wage rates:

	7/01/2022	11/01/2022
1st term	$ 21.15	TBD
2nd term	29.07	
3rd term	35.20	
4th term	47.38	

Supplemental Benefits:
(Per hour)

1st term	$ 17.15
2nd term	24.42
3rd term	27.06
4th term	32.15

Insulator - Heat & Frost — 10/01/2022

JOB DESCRIPTION Insulator - Heat & Frost **DISTRICT** 8

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour:	07/01/2022	05/31/2023
Insulator	$ 58.25	+ $ 2.00
Discomfort & Additional Training**	61.30	+ $ 2.00
Fire Stop Work*	31.15	+ $ 2.00

* Applies on all exclusive Fire Stop Work (When contract is for Fire Stop work only). No apprentices on these contracts only.

**Applies to work requiring; garb or equipment worn against the body not customarily worn by insulators;psychological evaluation;special training, including but not limited to "Yellow Badge" radiation training

Note: Additional $0.50 per hour for work 30 feet or more above floor or ground level.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 36.10
Discomfort & Additional Training	38.09
Fire Stop Work:	
Journeyworker	18.41

OVERTIME PAY
See (B, E, E2, Q, *T) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Note: Last working day preceding Christmas and New Years day, workers shall work no later than 12:00 noon and shall receive 8 hrs pay.

Overtime: See (2*, 4, 6, 16, 25) on HOLIDAY PAGE.
*Note: Labor Day triple time if worked.

REGISTERED APPRENTICES
(1) year terms:

Insulator Apprentices:

1st	2nd	3rd	4th
$ 31.15	$ 36.56	$ 41.98	$ 47.41

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
$ 32.67	$ 38.39	$ 44.12	$ 49.85

Supplemental Benefits paid per hour:

Insulator Apprentices:

1st term	$ 18.41
2nd term	21.94
3rd term	25.48
4th term	29.03

Discomfort & Additional Training Apprentices:

1st term	$ 19.41
2nd term	23.14
3rd term	26.88
4th term	30.62

Ironworker **10/01/2022**

JOB DESCRIPTION Ironworker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES
Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour:	07/01/2022	07/01/2023
Reinforcing & Metal Lathing	$ 56.90	Additional $ 1.50
"Base" Wage	$ 55.20 plus $ 1.70	

"Base" Wage is used to calculate overtime hours only.

SUPPLEMENTAL BENEFITS

Per hour:	
Reinforcing & Metal Lathing	$ 41.18

OVERTIME PAY
See (B, E, Q, *X) on OVERTIME PAGE
*Only $23.50 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half	$ 47.68
Double Time	$ 54.18

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 11, 13, *18, **19, 25) on HOLIDAY PAGE

*Note: Work performed after first 4 Hours.

REGISTERED APPRENTICES
(1) year terms at the following wage rates:

1st term	2nd term	3rd term	4th Term
Wage Per Hour:			
$ 22.55	$ 23.60	$ 24.60	$ 37.18
"Base" Wage			
$ 21.00 plus $1.55	$ 22.00 plus $1.60	$ 23.00 plus $1.60	$ 35.60 plus $1.58

"Base" Wage is used to calculate overtime hours ONLY.

SUPPLEMENTAL BENIFITS
Per Hour:

1st term	2nd term	3rd term	4th Term
$ 18.17	$ 17.17	$ 16.22	$ 22.50

4-46Reinf

Ironworker **10/01/2022**

JOB DESCRIPTION Ironworker **DISTRICT** 11

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster

WAGES
Per hour:

	07/01/2022	07/01/2023 Additional
Structural	$ 51.38	$ 2.34*
Reinforcing*	51.38	2.34*

Ornamental	51.38	2.34*
Chain Link Fence	51.38	2.34*

* To be allocated at a later date.

NOTE: For Reinforcing classification ONLY, Ironworker 4-46Reinf rates apply in Rockland County's southern section (south of Convent Road and east of Blue Hills Road).

On Government Mandated Irregular Work Days or Shift Work, the following wage will be paid:

1st Shift	$ 51.38
2nd Shift	65.79
3rd Shift	70.59

**Note- Any shift that works past 12:00 midnight shall receive the 3rd shift differential.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 42.71

OVERTIME PAY
See (B1, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE
If a holiday falls on Saturday, it will be observed Friday. If a holiday falls on Sunday, it will be observed Monday.

REGISTERED APPRENTICES
Wages:

(1) year terms at the following wage:

	1st yr	2nd yr	3rd yr	4th yr
1st Shift	$ 25.69	$ 30.83	$ 35.97	$ 41.10
2nd Shift	35.34	41.44	47.53	53.61
3rd Shift	38.56	44.97	51.38	57.77

Supplemental Benefits per hour:

1st year	$ 36.71
2nd year	37.91
3rd year	39.11
4th year	40.31

11-417

Laborer - Building — 10/01/2022

JOB DESCRIPTION Laborer - Building **DISTRICT** 11

ENTIRE COUNTIES
Rockland

WAGES
GROUP C: Liners, joint setters.

GROUP D: Air track operators.

GROUP E: Sealers, power buggy operators, mixer men, brush king, jack hammer, pavement breakers, vibrator men, powder men, torchmen.

GROUP F: Hazardous Waste Handler, Asbestos Worker, Mold Removal, Lead Removal and Bio Remediation where protective gear is needed.

GROUP H: Mason tender, rip rap and dry stone layers, concrete laborer, pipe layers, signal men, gabion basket assemblers, asphalt men, wrecking and demolition men.

GROUP I: Landscaping, flagmen, pitmen, dump men, temporary heat, building laborer (clean up).

WAGES: (per hour)	07/01/2022
GROUP C	$ 44.10
GROUP D	44.65
GROUP E	43.80

GROUP F	45.80
GROUP H	43.56
GROUP I	40.55

SHIFT DIFFERENTIAL: On all Governmental mandated or irregular or off shift work, an additional 20% of the wage will be paid hourly.

NOTE: All work five feet or more outside the building foundation line shall be deemed Heavy & Highway

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyman	$ 27.98

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE.
Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE.

REGISTERED APPRENTICES
(1000) hour terms at the following wages.

1st	2nd	3rd	4th
$ 22.22	$ 26.26	$ 30.30	$ 34.34

Supplemental Benefits per hour:

All Terms	$ 27.20

11-754B

Laborer - Heavy&Highway — 10/01/2022

JOB DESCRIPTION Laborer - Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Rockland

WAGES
CLASS 1: Flagperson, gateperson.

CLASS 2: General laborer, chuck tender, nipper, powder carrier, magazine tender, concrete men, vibrator men, mason tender, mortar men, traffic control, custodial work, temporary heat, pump men, pit men, dump men, asphalt men, joint setter, signalman, pipe men, riprap, dry stone layers, jack hammer, bush hammer, pavement breaker, men on mulching & seeding machines, all seeding & sod laying, landscape work, walk behind self-propelled power saws, grinder, walk behind rollers and tampers of all types, burner men, filling and wiring of baskets for gabion walls, chain saw operator, railroad track laborers, power buggy, plaster & acoustic pump, power brush cutter, retention liners, walk behind surface planer, chipping hammer, manhole, catch basin or inlet installing, mortar mixer, laser men. *Micropaving and crack sealing.

CLASS 3: Asbestos, toxic, bio-remediation and phyto-remediation, lead or hazardous materials abatement when certification or license is required, Drilling Equipment Only Where a Separate Air Compressor Unit Supplies Power.

CLASS 4: Asphalt screedman, blaster, all laborers involved in pipejacking and boring operations not exceeding more than 10 feet into pipe, boring or drilled area.

WAGES: (per hour)	07/01/2022	06/01/2023 Additional	06/01/2024 Additional
Class 1	$ 42.60	$ 2.15**	$ 2.25**
Class 2	46.10	2.25**	2.35**
Class 3	50.25	2.40**	2.45**
Class 4	52.35	3.70**	4.10**

* When laborers are performing micro paving, crack sealing or slurry application when not part of asphalt prep operations laborers shall receive an additional $2.50 per hour over rate.
** To be allocated at a later date.

SHIFT DIFFERENTIAL: Night work and irregular shift require 20% increase on wages for all Government mandated night and irregular shift work.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 28.38
Shift Differential	33.69

OVERTIME PAY
See (B, E, P, *R, **S, ***T, X) on OVERTIME PAGE
*For Mon-Fri Holidays, Double Benefits to be paid for all hours worked.
**For Saturday Holidays, Two and one Half Benefits for all hours worked.
***For Sunday Holidays, Triple Benefits for all hours worked.

HOLIDAY
Paid: See (5, 6, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE
To be eligible for a paid holiday, an employee must work at least two (2) days in the calendar week or payroll week in which the holiday falls.

REGISTERED APPRENTICES
(1000) hour terms at the following wages.

	07/01/2022
1st term	$ 22.22
2nd term	26.26
3rd term	30.30
4th term	34.34

Supplemental Benefits per hour:

All Terms Regular	$ 27.20
All Terms Shift Rate	32.31

11-754H/H

Laborer - Tunnel — 10/01/2022

JOB DESCRIPTION Laborer - Tunnel **DISTRICT** 11

ENTIRE COUNTIES
Columbia, Dutchess, Greene, Orange, Otsego, Putnam, Rockland, Sullivan, Ulster, Westchester

PARTIAL COUNTIES
Chenango: Townships of Columbus, Sherburne and New Berlin.
Delaware: Townships of Andes, Bovina, Middletown, Roxbury, Franklin, Hamden, Stamford, Delhi, Kortright, Harpersfield, Merideth and Davenport.

WAGES
Class 1: All support laborers/sandhogs working above the shaft or tunnel.

Class 2: All laborers/sandhogs working in the shaft or tunnel.

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel

WAGES: (per hour)

	07/01/2022
Class 1	$ 53.45
Class 2	55.60
Class 4	62.00
Class 5	44.80

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional $ 3.00 an hour.

SHIFT DIFFERENTIAL...On all Government mandated irregular shift work:
- Employee shall be paid at time and one half the regular rate Monday through Friday.
- Saturday shall be paid at 1.65 times the regular rate.
- Sunday shall be paid at 2.15 times the regular rate.

SUPPLEMENTAL BENEFITS
Per hour:

Benefit 1	$ 34.45
Benefit 2	51.60
Benefit 3	68.75

Benefit 1 applies to straight time hours, paid holidays not worked.

Benefit 2 applies to over 8 hours in a day (M-F), irregular shift work hours worked, and Saturday hours worked.
Benefit 3 applies to Sunday and Holiday hours worked.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE
When a recognized Holidays falls on Saturday or Sunday, holidays falling on Saturday shall be recognized or observed on Friday and holidays falling on Sunday shall be recognized or observed on Monday. Employees ordered to work on the Saturday or Sunday of the holiday or on the recognized or the observed Friday or Monday for those holidays falling on Saturday or Sunday shall receive double time the established rate and benefits for the holiday.

REGISTERED APPRENTICES
FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and location where the work is to be performed.

11-17/60/235/754Tun

Lineman Electrician — 10/01/2022

JOB DESCRIPTION Lineman Electrician **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe, or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. (Ref #14.01.01)

Per hour:	07/01/2022	05/01/2023	05/06/2024
Lineman, Technician	$ 56.00	$ 57.40	$ 58.90
Crane, Crawler Backhoe	56.00	57.40	58.90
Welder, Cable Splicer	56.00	57.40	58.90
Digging Mach. Operator	50.40	51.66	53.01
Tractor Trailer Driver	47.60	48.79	50.07
Groundman, Truck Driver	44.80	45.92	47.12
Equipment Mechanic	44.80	45.92	47.12
Flagman	33.60	34.44	35.34

Additional $1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work". (Ref #14.02.01-A)

Lineman, Technician	$ 56.00	$ 57.40	$ 58.90
Crane, Crawler Backhoe	56.00	57.40	58.90
Cable Splicer	61.60	63.14	64.79
Certified Welder - Pipe Type Cable	58.80	60.27	61.85
Digging Mach. Operator	50.40	51.66	53.01
Tractor Trailer Driver	47.60	48.79	50.07
Groundman, Truck Driver	44.80	45.92	47.12

Equipment Mechanic	44.80	45.92	47.12
Flagman	33.60	34.44	35.34

Additional $1.00 per hour for entire crew when a helicopter is used.

Below rates apply on switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. (Ref #14.02.01-B)

Lineman, Tech, Welder	$ 57.32	$ 58.72	$ 60.22
Crane, Crawler Backhoe	57.32	58.72	60.22
Cable Splicer	63.05	64.59	66.24
Certified Welder -			
Pipe Type Cable	60.19	61.66	63.23
Digging Mach. Operator	51.59	52.85	54.20
Tractor Trailer Driver	48.72	49.91	51.19
Groundman, Truck Driver	45.86	46.98	48.18
Equipment Mechanic	45.86	46.98	48.18
Flagman	34.39	35.23	36.13

Additional $1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. (Ref #14.03.01)

Lineman, Tech, Welder	$ 58.51	$ 59.91	$ 61.41
Crane, Crawler Backhoe	58.51	59.91	61.41
Cable Splicer	58.51	59.91	61.41
Digging Mach. Operator	52.66	53.92	55.27
Tractor Trailer Driver	49.73	50.92	52.20
Groundman, Truck Driver	46.81	47.93	49.13
Equipment Mechanic	46.81	47.93	49.13
Flagman	35.11	35.95	36.85

Additional $1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.
NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour worked (but also required on non-worked holidays):

	07/01/2022	05/01/2023	05/06/2024
Journeyman	$ 25.90 *plus 7% of the hourly wage paid	$ 26.40 *plus 7% of the hourly wage paid	$ 26.90 *plus 7% of the hourly wage paid
Journeyman Lineman or Equipment Operators with Crane License	$ 27.90 *plus 7% of the hourly wage paid	$ 29.40 *plus 7% of the hourly wage paid	$ 30.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

OVERTIME PAY
See (B, E, Q,) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid	See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.
Overtime	See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

07/01/2022	05/01/2023	05/06/2024
$ 25.90 *plus 7% of the hourly wage paid	$ 26.40 *plus 7% of the hourly wage paid	$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249a

Lineman Electrician - Teledata — 10/01/2022

JOB DESCRIPTION Lineman Electrician - Teledata **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour:

For outside work, stopping at first point of attachment (demarcation).

	07/01/2022	01/01/2023	01/01/2024	01/01/2025
Cable Splicer	$ 36.28	$ 37.73	$ 39.24	$ 40.81
Installer, Repairman	$ 34.43	$ 35.81	$ 37.24	$ 38.73
Teledata Lineman	$ 34.43	$ 35.81	$ 37.24	$ 38.73
Tech., Equip. Operator	$ 34.43	$ 35.81	$ 37.24	$ 38.73
Groundman	$ 18.25	$ 18.98	$ 19.74	$ 20.53

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2022	01/01/2023	01/01/2024	01/01/2025
Journeyman	$ 5.14 *plus 3% of the hourly wage paid	$ 5.14 *plus 3% of the hourly wage paid	$ 5.14 *plus 3% of the hourly wage paid	$ 5.14 *plus 3% of the hourly wage paid

*The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting — 10/01/2022

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting **DISTRICT** 6

ENTIRE COUNTIES
Columbia, Dutchess, Orange, Putnam, Rockland, Ulster

WAGES
Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.
(Ref #14.01.02)

Per hour:	07/01/2022	05/01/2023	05/06/2024
Lineman, Technician	$ 49.47	$ 50.60	$ 51.82
Crane, Crawler Backhoe	49.47	50.60	51.82
Certified Welder	51.94	53.13	54.41
Digging Machine	44.52	45.54	46.64
Tractor Trailer Driver	42.05	43.01	44.05
Groundman, Truck Driver	39.58	40.48	41.46
Equipment Mechanic	39.58	40.48	41.46
Flagman	29.68	30.36	31.09

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.
NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour worked (but also required on non-worked holidays):

	07/01/2022	05/01/2023	05/06/2024
Journeyman	$ 25.90 *plus 7% of the hourly wage paid	$ 26.40 *plus 7% of the hourly wage paid	$ 26.90 *plus 7% of the hourly wage paid

Journeyman Lineman or Equipment Operators with Crane License	$ 27.90 *plus 7% of the hourly wage paid	$ 29.40 *plus 7% of the hourly wage paid	$ 30.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 13, 25) on HOLIDAY PAGE and Governor of NYS Election Day.
Overtime: See (5, 6, 8, 13, 25) on HOLIDAY PAGE and Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

07/01/2022	05/01/2023	05/06/2024
$ 25.90 *plus 7% of the hourly wage paid	$ 26.40 *plus 7% of the hourly wage paid	$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249aReg8LT

Lineman Electrician - Tree Trimmer — 10/01/2022

JOB DESCRIPTION Lineman Electrician - Tree Trimmer **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also would include stump removal near underground energized electrical lines, including telephone and CATV lines.

Per hour:	07/01/2022	01/01/2023
Tree Trimmer	$ 28.25	$ 29.80
Equipment Operator	24.98	26.35
Equipment Mechanic	24.98	26.35
Truck Driver	20.80	21.94
Groundman	17.13	18.07
Flag person	13.20*	13.20*

*NOTE: Subject to change due to any minimum wage increases.

SUPPLEMENTAL BENEFITS
Per hour worked (but also required on non-worked holidays):

	07/01/2022	01/01/2023
Journeyman	$ 10.23 *plus 3% of the hourly wage paid	$ 10.48 *plus 3% of the hourly wage paid

* The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 15) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday.
All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building — 10/01/2022

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2022	12/05/2022	06/05/2023
		Additional	Additional
Tile Finisher	$ 47.60	$ 0.59	$ 0.58

SUPPLEMENTAL BENEFITS
Per Hour:
$ 22.16*
+ $9.85
*This portion of benefits subject to same premium rate as shown for overtime wages

OVERTIME PAY
See (B, E, Q, *V) on OVERTIME PAGE
*Work beyond 10 hours on a Saturday shall be paid at double the hourly wage rate.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

9-7/88A-tf

Mason - Building — 10/01/2022

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2022	12/05/2022	06/05/2023
		Additional	Additional
Tile Setters	$ 62.01	$ 0.73	$ 0.73

SUPPLEMENTAL BENEFITS
Per Hour:
$ 26.13*
+ $10.02

* This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE
Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wage per hour:

(750 hour) term at the following wage rate:
Term:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-	751-	1501-	2251-	3001-	3751-	4501-	5251-	6001-	6501-

750	1500	2250	3000	3750	4500	5250	6000	6750	7000
$21.23	$26.11	$33.26	$38.14	$41.67	$45.04	$48.60	$53.47	$56.25	$60.33

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$12.55* +$.69	$12.55* +$.74	$15.16* +$.84	$15.16* +$.88	$16.75* +$1.28	$18.30* +$1.33	$19.35* +$1.70	$19.40* +$1.75	$17.45* +$5.90	$22.80* +$6.42

* This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52A

Mason - Building — 10/01/2022

JOB DESCRIPTION Mason - Building **DISTRICT** 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

PARTIAL COUNTIES
Orange: Only the Township of Tuxedo.

WAGES
Per hour:

	07/01/2022	06/01/2023
Bricklayer	$ 44.79	$ 45.89
Cement Mason	44.79	45.89
Plasterer/Stone Mason	44.79	45.89
Pointer/Caulker	44.79	45.89

Additional $1.00 per hour for power saw work
Additional $0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular work day is mandated or required by state, federal, county, local or other governmental agency contracts, the following premiums apply:
Irregular work day requires 15% premium
Second shift an additional 15% of wage plus benefits to be paid
Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 37.00	$ 37.95

OVERTIME PAY
OVERTIME:
Cement Mason — See (B, E, Q, W) on OVERTIME PAGE.
All Others — See (B, E, Q) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE
Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of journeyman supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Apprentices indentured before June 1st, 2011 receive full journeyman benefits

11-5wp-b

Mason - Building 10/01/2022

JOB DESCRIPTION Mason - Building **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES
Wages: 07/01/2022

Marble Cutters & Setters	$ 62.17

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyworker	$ 38.27

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wage Per Hour:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6751	6751-7500
$ 24.88	$ 27.97	$ 31.08	$ 34.17	$ 37.29	$ 40.39	$ 43.51	$ 46.61	$ 52.82	$ 59.05

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 20.55	$ 22.04	$ 23.52	$ 25.01	$ 26.47	$ 27.96	$ 29.42	$ 30.91	$ 33.86	$ 36.81

9-7/4

Mason - Heavy&Highway 10/01/2022

JOB DESCRIPTION Mason - Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

PARTIAL COUNTIES
Orange: Only the Township of Tuxedo.

WAGES
Per hour:

	07/01/2022	06/01/2023
Bricklayer	$ 45.29	$ 46.39
Cement Mason	45.29	46.39
Marble/Stone Mason	45.29	46.39
Plasterer	45.29	46.39
Pointer/Caulker	45.29	46.39

Additional $1.00 per hour for power saw work
Additional $0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular work day is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:
Irregular work day requires 15% premium
Second shift an additional 15% of wage plus benefits to be paid
Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 37.00	$ 37.95

OVERTIME PAY
Cement Mason See (B, E, Q, W)
All Others See (B, E, Q,)

HOLIDAY
Paid: See (5, 6, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE
- Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.
- Supplemental Benefits are not paid for paid Holiday
- If Holiday is worked, Supplemental Benefits are paid for hours worked.
- Whenever an Employee works within three (3) calendar days before a holiday, the Employee shall be paid for the Holiday.

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of journeyman supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Apprentices indentured before June 1st, 2011 receive full journeyman benefits

11-5WP-H/H

Operating Engineer - Building / Heavy&Highway 10/01/2022

JOB DESCRIPTION Operating Engineer - Building / Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Delaware, Orange, Rockland, Sullivan, Ulster

WAGES
CLASS A5: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with 140ft boom and over.
CLASS A4: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with 100ft to 139ft boom.
CLASS A3: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes with a boom under 100ft.
CLASS A2: Cranes, Derricks and Pile Drivers less than 100 tons with 140ft boom and over.
CLASS A1: Cranes, Derricks and Pile Drivers less than 100 tons with a 100ft to 139ft boom.

CLASS A: Cranes, Derricks and Pile Drivers less than 100 tons with a boom under 100ft.; Autograde Combination Subgrader, Base Material Spreader and Base Trimmer (CMI and Similar Types); Autograde Pavement profiler (CMI and Similar Types); Autograde Pavement Profiler and Recycle type (CMI and Similar Type); Autograde Placer-Trimmer-Spreader Comb. (CMI & Similar types); Autograde Slipform Paver (CMI & Similar Types); Central Power Plants (all types); Chief of Party; Concrete Paving Machines; Drill (Bauer, AMI and Similar Types); Drillmaster, Quarrymaster (Down the Hole Drill), Rotary Drill, Self-Propelled Hydraulic Drill, Self-Powered Drill; Draglines; Elevator Graders; Excavator; Front End Loaders (5 yds. and over); Gradalls; Grader-Rago; Helicopters (Co-Pilot); Helicopters (Communications Engineer);Juntann Pile Driver; Locomotive (Large); Mucking Machines; Pavement & Concrete Breaker, i.e., Superhammer & Hoe Ram; Roadway Surface Grinder; Prentice Truck; Scooper (Loader and Shovel); Shovels; Tree Chopper with Boom; Trench Machines (Cable Plow); Tunnel Boring Machine; Vacuum Truck

CLASS B: "A" Frame; Backhoe (Combination); Boom Attachment on Loaders (Rate based on size of Bucket) not applicable to Pipehook; Boring and Drilling Machines; Brush Chopper, Shredder and Tree Shredder, Tree Shearer; Bulldozer(Fine Grade); Cableways; Carryalls; Concrete Pump; Concrete Pumping System, Pump Concrete and Similar Types; Conveyors (125 ft. and over); Drill Doctor (duties incl. Dust Collector Maintenance); Front End Loaders (2 yds. but less than 5 yds.); Graders (Finish); Groove Cutting Machine (Ride on Type); Heater Planer; Hoists (all type Hoists, shall also include Steam, Gas, Diesel, Electric, Air Hydraulic, Single and Double Drum, Concrete, Brick Shaft Caisson, Snorkel Roof, and/or any other Similar Type Hoisting Machines, portable or stationary, except Chicago Boom Type); Long Boom Rate to be applied if Hoist is "Outside Material Tower Hoist"**; Hydraulic Cranes-10 tons and under; Hydraulic Dredge; Hydro-Axe; Hydro Blaster; Jacks-Screw Air Hydraulic Power Operated Unit or Console Type (not hand Jack or Pile Load Test Type); Log Skidder; Pans; Pavers (all) concrete; Plate and Frame Filter Press; Pumpcrete Machines, Squeezecrete & Concrete Pumping (regardless of size); Scrapers; Side Booms; "Straddle"Carrier-Ross and similar types; Winch Trucks (Hoisting); Whip Hammer

CLASS C: Asphalt Curbing Machine; Asphalt Plant Engineer; Asphalt Spreader; Autograde Tube Finisher and Texturing Machine (CMI & Similar types); Autograde Curecrete Machine (CMI & Similar Types); Autograde Curb Trimmer & Sidewalk, Shoulder, Slipform (CMI & Similar Types); Bar Bending Machines (Power); Batchers, Batching Plant and Crusher on Site; Belt Conveyor Systems; Boom Type Skimmer Machines; Bridge Deck Finisher; Bulldozer(except fine grade); Car Dumpers (Railroad); Compressor and Blower Type Units (used independently or mounted on dual purpose Trucks, on Job Site or in conjunction with jobsite, in Loading and Unloading of Concrete, Cement, Fly Ash, Instantcrete, or Similar Type Materials); Compressors (2 or 3 in Battery); Concrete Finishing Machines; Concrete cleaning decontamination machine operator; Concrete Saws and Cutters (Ride-on type); Concrete Spreaders (Hetzel, Rexomatic and Similar Types); Concrete Vibrators; Conveyors (under 125 feet); Crushing Machines; Directional Boring Machines; Ditching Machine-small (Ditch-witch, Vermeer, or Similar type); Dope Pots (Mechanical with or without pump); Dumpsters; Elevator; Fireman; Fork Lifts (Economobile, Lull and Similar Types of Equipment); Front End Loaders (1 yd. and over but under 2 yds.); Generators (2 or 3 in Battery); Giraffe Grinders; Grout Pump; Gunnite Machines (excluding nozzle); Hammer Vibrator (in conjunction with Generator); Heavy Equipment Robotics Operator Technician; Hoists-Roof, Tugger, Aerial Platform Hoist & House Cars; Hoppers; Hopper Doors (power operated); Hydro Blaster; Hydraulic Jacking Trailer; Ladders (motorized); Laddervator; Locomotive-dinky type; Maintenance -Utility Man; Master Environmental Maintenance Technician; Mechanics; Mixers (Excepting Paving Mixers); Motor Patrols; Pavement Breakers (small self propelled ride on type-also maintains compressor hydraulic unit); Pavement Breaker-truck mounted; Pipe Bending Machine (Power); Pitch Pump; Plaster Pump (regardless of size); Post Hole Digger (Post Pounder & Auger); Rod Bending Machines (Power); Roller-Black Top; Scales (Power); Seaman pulverizing mixer; Shoulder widener; Silos; Skidsteer (all attachments); Skimmer Machines (boom-type); Steel Cutting Machine (service & maintain); Tam Rock Drill; Tractors; Transfer Machine; Captain (Power Boats); Tug Master (powerboats); Ultra High Pressure Waterjet Cutting Tool System operator/maintenance technician; Vacuum Blasting Machine; Vibrating Plants (used in conjunction with unloading); Welder and Repair Mechanics

CLASS D: Brooms and Sweepers; Chippers; Compressor (single); Concrete Spreaders (small type); Conveyor Loaders (not including Elevator Graders); Engines-large diesel (1620 HP) and Staging Pump; Farm Tractors; Fertilizing Equipment (Operation & Maintenance of); Fine Grade Machine (small type); Form Line Graders (small type); Front End Loader (under 1 yard); Generator (single); Grease, Gas, Fuel and Oil supply trucks; Heaters (Nelson or other type incl. Propane, Natural Gas or Flowtype Units); Lights, Portable Generating Light Plants; Mixers (Concrete, small); Mulching Equipment (Operation and Maintenance of); Pumps (2 or less than 4 inch suction); Pumps (4 inch suction and over incl. submersible pumps); Pumps (Diesel Engine and Hydraulic-immaterial of power); Road Finishing Machines (small type); Rollers-grade, fill or stone base; Seeding Equip. (Operation and Maintenance of); Sprinkler & Water Pump Trucks (used on jobsite or in conjunction with jobsite); Steam Jennies and Boilers-irrespective of use; Stone Spreader; Tamping Machines, Vibrating Ride-on; Temporary Heating Plant (Nelson or other type, incl. Propane, Natural Gas or Flow Type Units); Water & Sprinkler Trucks (used on or in conjunction with jobsite); Welding Machines (Gas, Diesel, and/or Electric Converters of any type, single, two, or three in a battery); Wellpoint Systems (including installation by Bull Gang and Maintenance of)

CLASS E: Assistant Engineer/Oiler; Drillers Helper; Maintenance Apprentice (Deck Hand); Maintenance Apprentice (Oiler); Mechanics' Helper; Tire Repair and Maintenance; Transit/Instrument Man

WAGES:(per hour)

	07/01/2022
Class A5	$ 63.72 plus 3.00*
Class A4	62.72 plus 3.00*
Class A3	61.72 plus 3.00*
Class A2	59.22 plus 3.00*
Class A1	58.22 plus 3.00*
Class A	57.22 plus 3.00*
Class B	55.63 plus 3.00*
Class C	53.72 plus 3.00*
Class D	52.09 plus 3.00*
Class E	50.38 plus 3.00*
Safety Engineer	57.96 plus 3.00*
Helicopter:	
Pilot/Engineer	59.04 plus 3.00*
Co Pilot	57.22 plus 3.00*
Communications Engineer	57.22 plus 3.00*
Surveying:	
Chief of Party	57.22 plus 3.00*
Transit/Instrument Man	50.38 plus 3.00*
Rod/Chainman	47.80 plus 3.00*

Additional $0.75 for Survey work Tunnel under compressed air.
Additional $0.50 for Hydrographic work.

*The $3.00 is added to the Class Base Wage for all hours worked. Additionally, the $3.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

**Outside Material Hoist (Class B) receives additional $ 1.00 per hour on 110 feet up to 199 feet total height, $ 2.00 per hour on 200 feet and over total height.

- SHIFT WORK: On all Government mandated irregular or off shift work, an additional 15% on straight time hours.

- On HAZARDOUS WASTE REMOVAL or ASBESTOS REMOVAL work, or any state or federally DESIGNATED HAZARDOUS WASTE SITE:

For projects bid on or before April 1, 2020...Where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection, the Operating Engineer shall receive the hourly wage plus an additional twenty percent (20%) of that wage for the entire shift.

For projects bid after April 1, 2020...On hazardous waste removal work of any kind, including state or federally designated site where the operating engineer is required to wear level A, B, or C personal protection the operating engineer shall receive an hourly wage rate of his regular hourly wage plus $5.00 per hour. An operating engineer working at a hazardous waste removal project or site at a task requiring hazardous waste related certification, but who is not working in a zone requiring level A, B, or C personal protection, shall receive an hourly wage rate of his regular rate plus $ 1.00 per hour. This shall also apply to sites where the level D personal protection is required.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 33.50

SHIFT WORK: On all Government mandated irregular or off shift work, an additional 15% on straight time hours.

OVERTIME PAY
See (B, E, Q, *V, X) on OVERTIME PAGE
*15% premium is also required on shift work benefits

HOLIDAY
Paid: See (5, 6, 10, 13, 15) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 13, 15) on HOLIDAY PAGE
Holidays falling on Sunday will be celebrated on Monday.

REGISTERED APPRENTICES
(1) year terms at the following percentage of journeyman's wage:

1st year	60% of Class base wage plus $3.00*
2nd year	70% of Class base wage plus $3.00*
3rd year	80% of Class base wage plus $3.00*
4th year	90% of Class base wage plus $3.00*

*The $3.00 is added to the Class Base Wage for all hours worked. Additionally, the $3.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

Supplemental Benefits per hour:

Apprentices	$ 33.50

11-825

Operating Engineer - Marine Dredging — 10/01/2022

JOB DESCRIPTION Operating Engineer - Marine Dredging **DISTRICT** 4

ENTIRE COUNTIES
Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES
These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2022	10/01/2022
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	$ 42.66	$ 43.94
CLASS A2 Crane Operator (360 swing)	38.02	39.16

CLASS B Dozer, Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	36.89	38.00
CLASS B2 Certified Welder	34.73	35.77
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	33.78	34.79
CLASS C2 Boat Operator	32.69	33.67
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	27.16	27.97

SUPPLEMENTAL BENEFITS
Per Hour:
THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	$ 11.40 plus 6% of straight time wage, Overtime hours add $ 0.63	$ 11.85 plus 6% of straight time wage, Overtime hours add $ 0.63
All Class C	$ 11.10 plus 6% of straight time wage, Overtime hours add $ 0.48	$ 11.60 plus 6% of straight time wage, Overtime hours add $ 0.50
All Class D	$ 10.80 plus 6% of straight time wage, Overtime hours add $ 0.33	$ 11.35 plus 6% of straight time wage, Overtime hours add $ 0.38

OVERTIME PAY
See (B2, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Steel Erectors — 10/01/2022

JOB DESCRIPTION Operating Engineer - Steel Erectors **DISTRICT** 11

ENTIRE COUNTIES
Delaware, Orange, Rockland, Sullivan, Ulster

WAGES
CLASS A3: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with a 140 ft. boom and over.

CLASS A2: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with up to a 139 ft. boom and under.

CLASS A1: Cranes, Derricks and Pile Drivers less than 100 tons with a 140 ft. boom and over.

CLASS A: Cranes, Derricks and Pile Drivers less than 100 tons with up to a 139 ft. boom and under.

CLASS B: "A" Frame; Cherry Pickers(10 tons and under); Hoists (all type Hoists, shall also include Steam, Gas, Diesel, Electric, Air Hydraulic, Single and Double Drum, Concrete, Brick Shaft Caisson, Snorkel Roof, and/or any other Similar Type Hoisting Machines, portable or stationary, except Chicago Boom Type); Jacks-Screw Air Hydraulic Power Operated Unit or Console Type (not hand Jack or Pile Load Test Type); Side Booms; Straddle Carrier

CLASS C: Aerial Platform used as Hoist; Compressors (2 or 3 in Battery); Concrete cleaning/ decontamination machine operator; Directional Boring Machines; Elevator or House Cars; Conveyers and Tugger Hoists; Fireman; Fork Lifts; Generators (2 or 3 in Battery); Heavy Equipment Robotics Operator/Technician; Master Environmental Maintenance Technician; Maintenance -Utility Man; Rod Bending Machines (Power); Captain(powerboat); Tug Master; Ultra High Pressure Waterjet Cutting Tool System; Vacuum Blasting Machine; Welding Machines(gas or electric,2 or 3 in battery, including diesels); Transfer Machine; Apprentice Engineer/Oiler with either one compressor or one welding machine when used for decontamination and remediation

CLASS D: Compressor (single); Welding Machines (Gas, Diesel, and/or Electric Converters of any type); Welding System Multiple (Rectifier Transformer type)

CLASS E: Assistant Engineer/Oiler; Maintenance Apprentice (Deck Hand);Drillers Helper; Maintenance Apprentice (Oiler); Mechanics' Helper; Transit/Instrument Man

WAGES:(per hour)

	07/01/2022
Class A3	$ 65.74 plus 3.00*
Class A2	64.08 plus 3.00*
Class A1	61.24 plus 3.00*
Class A	59.58 plus 3.00*
Class B	56.79 plus 3.00*
Class C	54.13 plus 3.00*
Class D	52.60 plus 3.00*
Class E	50.84 plus 3.00*
Vacuum Truck	57.55 plus 3.00*
Safety Engineer	58.41 plus 3.00*
Helicopter:	
Pilot/Engineer	61.24 plus 3.00*
Co Pilot	60.85 plus 3.00*
Communications Engineer	60.85 plus 3.00*
Surveying:	
Chief of Party	57.55 plus 3.00*
Transit/Instrument man	50.84 plus 3.00*
Rod/Chainman	47.80 plus 3.00*

Additional $0.75 for Survey work Tunnels under compressed air.
Additional $0.50 for Hydrographic work.

*The $3.00 is added to the Class Base Wage for all hours worked. Additionally, the $3.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

- SHIFT WORK: On all Government mandated irregular or off shift work, an additional 15% on straight time hours.
- On HAZARDOUS WASTE REMOVAL or ASBESTOS REMOVAL work, or any state or federally DESIGNATED HAZARDOUS WASTE SITE:

For projects bid on or before April 1, 2020...Where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection, the Operating Engineer shall receive the hourly wage plus an additional twenty percent (20%) of that wage for the entire shift.

For projects bid after April 1, 2020...On hazardous waste removal work of any kind, including state or federally designated site where the operating engineer is required to wear level A, B, or C personal protection the operating engineer shall receive an hourly wage rate of his regular hourly wage plus $5.00 per hour. An operating engineer working at a hazardous waste removal project or site at a task requiring hazardous waste related certification, but who is not working in a zone requiring level A, B, or C personal protection, shall receive an hourly wage rate of his regular rate plus $ 1.00 per hour. This shall also apply to sites where the level D personal protection is required.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman $ 33.50

OVERTIME PAY
See (B, E, Q, *V, X) on OVERTIME PAGE
*15% premium is also required on shift work benefits

HOLIDAY
Paid: See (5, 6, 10, 13, 15) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 13, 15) on HOLIDAY PAGE
Holidays falling on Sunday will be celebrated on Monday.

REGISTERED APPRENTICES
(1) year terms at the following percentage of journeyman's wage.

1st year	60% of Class base wage plus $3.00*
2nd year	70% of Class base wage plus $3.00*
3rd year	80% of Class base wage plus $3.00*
4th year	90% of Class base wage plus $3.00*

*The $3.00 is added to the Class Base Wage for all hours worked. Additionally, the $3.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

Supplemental Benefits per hour:

Apprentices $ 33.50

11-825SE

Painter 10/01/2022

JOB DESCRIPTION Painter **DISTRICT** 1

ENTIRE COUNTIES
Rockland

WAGES
Wages per hour

	07/01/2022
Brush/Paper Hanger	$ 40.29
Dry Wall finisher	40.29
Sandblaster-Painter	40.29
Lead Abatement	40.29
Spray Rate	41.29

See Bridge Painters rates for the following work:
Structural Steel, all work performed on tanks, ALL BRIDGES, towers, smoke stacks, flag poles. Rate shall apply to all of said areas from the ground up.

SUPPLEMENTAL BENEFITS
Per hour

Journeyperson $ 25.29

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE
THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SHIFT(S) OR SINGULAR IRREGULAR SHIFT OF AT LEAST A FIVE (5) DAY DURATION (MONDAY THROUGH FRIDAY), WHEN THE SHIFT STARTS BETWEEN THE HOURS LISTED BELOW:

4:00 PM to 6:30 AM REGULAR RATE PLUS 15%**

OVERTIME ON MULTIPLE SHIFT WORK AND SINGULAR IRREGULAR SHIFT THE SHIFT RATE IS THE BASE RATE
**SHIFT RATE STOPS AFTER 6:30AM

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour

Six (6) month terms at the following percentage of Journeyperson's wage

1st	2nd	3rd	4th	5th	6th

40% 50% 60% 70% 80% 90%

Supplemental Benefits per hour worked

1st term	$ 10.99
All others	25.29

1-155ROC

Painter - Bridge & Structural Steel 10/01/2022

JOB DESCRIPTION Painter - Bridge & Structural Steel **DISTRICT** 8

ENTIRE COUNTIES
Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES
Per Hour:
STEEL:

Bridge Painting:	07/01/2022	10/01/2022
	$ 53.00	$ 54.50
	+ 9.63*	+ 10.10*

ADDITIONAL $6.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

NOTE: All premium wages are to be calculated on base rate per hour only.

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK:

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS
Per Hour:
Journeyworker:

	$ 10.90	$ 11.78
	+ 30.60*	+ 30.75*

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

OVERTIME PAY
See (B, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wage - Per hour:
Apprentices: (1) year terms

1st year	$ 21.20	$ 21.80
	+ 3.86	+ 4.04
2nd year	$ 31.80	$ 32.70
	+ 5.78	+ 6.06
3rd year	$ 42.40	$ 43.60

	+ 7.70	+ 8.08
Supplemental Benefits - Per hour:		
1st year	$ .25	$ .25
	+ 12.24	+ 12.34
2nd year	$ 10.90	$ 10.90
	+ 18.36	+ 18.51
3rd year	$ 10.90	$ 10.90
	+ 24.48	+ 24.68

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

Painter - Line Striping — 10/01/2022

JOB DESCRIPTION Painter - Line Striping **DISTRICT** 8

ENTIRE COUNTIES
Albany, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES
Per hour:

	07/01/2022
Painter (Striping-Highway):	
Striping-Machine Operator*	$ 31.53
Linerman Thermoplastic	38.34

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour paid:
Journeyworker:

Striping Machine Operator:	$ 10.03
Linerman Thermoplastic:	10.03

OVERTIME PAY
See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 20) on HOLIDAY PAGE
Overtime:	See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES
One (1) year terms at the following wage rates:

1st Term:	$ 15.00
2nd Term:	18.92
3rd Term:	25.22

Supplemental Benefits per hour:

1st term:	$ 9.16
2nd Term:	10.03
3rd Term:	10.03

8-1456-LS

Painter - Metal Polisher — 10/01/2022

JOB DESCRIPTION Painter - Metal Polisher **DISTRICT** 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2022
Metal Polisher	$ 37.78
Metal Polisher*	38.80
Metal Polisher**	41.78

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2022
Journeyworker:	
All classification	$ 11.24

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year term at the following wage rates:

	07/01/2022
1st year	$ 16.00
2nd year	17.00
3rd year	18.00
1st year*	$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	$ 18.50
2nd year**	19.50
3rd year**	20.50

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	$ 7.99
2nd year	7.99
3rd year	7.99

8-8A/28A-MP

Plumber — 10/01/2022

JOB DESCRIPTION Plumber **DISTRICT** 11

ENTIRE COUNTIES
Orange, Rockland, Sullivan

PARTIAL COUNTIES
Ulster: Only the Townships of Plattekill, Marlboro, Wawarsing, and Shawangunk (except for Wallkill and Shawangunk Prisons).

WAGES
REFRIGERATION: For commercial and industrial refrigeration which means service, maintenance, and installation work where the combined compressor tonnage does not exceed 40 tons.
AIR CONDITIONING: Air conditioning to be installed that is water cooled shall not exceed 25 tons. This will include the piping of the component system and erection of water tower. Air conditioning that is air cooled shall not exceed 50 tons.

WAGES: (per hour)

	07/01/2022	05/01/2023 Additional	05/01/2024 Additional	05/01/2025 Additional
Plumber	$ 37.34	$ 2.25*	$ 2.25*	$ 2.50*

*to be allocated at a later date

Star Certification: an additional $ 1.00 per hour over scale will be paid to all those who have Star Certification.

Shift Differential: When mandated by the governmental agency, an additional 15% premium will be paid for irregular work day or for 2nd and 3rd shift.

SUPPLEMENTAL BENEFITS
Per hour:
Journeyman
$ 35.07*

*For overtime or shift differential work, $0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.

OVERTIME PAY
See (B, G, P, *V) on OVERTIME PAGE
* A portion of the benefit amount is subject to the V code for overtime and shift differential work.

HOLIDAY
Paid: See (5, 6, 13, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 13, 15, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1)year terms at the following wage.

	07/01/2022
1st term	$ 16.81
2nd term	20.54
3rd term	24.28
4th term	28.01
5th term	31.74

Supplemental Benefits per hour:
Apprentices

1st term	$ 15.86*
2nd term	19.36*
3rd term	22.85*
4th term	26.36*
5th term	29.85*

*For overtime or shift differential work, $0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.

11-373 Refrig

Plumber — 10/01/2022

JOB DESCRIPTION Plumber **DISTRICT** 11

ENTIRE COUNTIES
Orange, Rockland, Sullivan

PARTIAL COUNTIES
Ulster: Only the Townships of Plattekill, Marlboro, Wawarsing, and Shawangunk (except for Wallkill and Shawangunk Prisons).

WAGES

WAGES:(per hour)	07/01/2022	05/01/2023 Additional	05/01/2024 Additional
Plumber/Steamfitter	$ 49.45	$ 2.25*	$ 2.25*

*to be allocated at a later date

Note: For all work 40-60 feet above ground add $ 0.25 per hour, over 60 feet add $ 0.50 per hour.

Shift Differential: When mandated by the governmental agency, an additional 15% premium will be paid for irregular work day or for 2nd and 3rd shift.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman $ 43.07*

*For overtime or shift differential work, $0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.

OVERTIME PAY
See (B, E, Q, *V) on OVERTIME PAGE
* A portion of the benefit amount is subject to the V code for overtime and shift differential work.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE
When a holiday falls on a Saturday, the day prior shall be considered and recognized as the holiday. When a holiday falls on a Sunday, the day proceeding shall be considered and recognized as the holiday to be observed.

REGISTERED APPRENTICES
(1) year terms at the following wages.

	07/01/2022
1st term	$ 17.31
2nd term	22.26
3rd term	27.20
4th term	32.15
5th term	39.56

Supplemental Benefits per hour:

1st term	$ 15.16*
2nd term	19.45*
3rd term	23.74*
4th term	28.04*
5th term	34.47*

*For overtime or shift differential work, $0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.

11-373 SF

Roofer — 10/01/2022

JOB DESCRIPTION Roofer **DISTRICT** 9

ENTIRE COUNTIES
Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2022	05/01/2023 Additional
Roofer/Waterproofer	$ 45.25 + $7.00*	$ 2.00

* This portion is not subjected to overtime premiums.

Note: Abatement/Removal of Asbestos containing roofs and roofing material is classified as Roofer.

SUPPLEMENTAL BENEFITS
Per Hour: $ 30.62

OVERTIME PAY
See (B, H) on OVERTIME PAGE
Note: An observed holiday that falls on a Sunday will be observed the following Monday.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
(1) year term

1st	2nd	3rd	4th
$ 15.84	$ 22.63 + 3.50*	$ 27.15 + 4.20*	$ 33.94 + 5.26*

Supplements:

1st	2nd	3rd	4th
$ 3.88	$ 15.48	$ 18.50	$ 23.04

* This portion is not subjected to overtime premiums.

9-8R

Sheetmetal Worker — 10/01/2022

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 8

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

	07/01/2022
SheetMetal Worker	$ 45.25
	+ 3.52*

*This portion is not subject to overtime premiums.

SHIFT WORK
For all NYS D.O.T. and other Governmental mandated off-shift work:
10% increase for additional shifts for a minimum of five (5) days

SUPPLEMENTAL BENEFITS
Journeyworker $ 45.20

OVERTIME PAY
OVERTIME:.. See (B, E, Q,) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 23) on HOLIDAY PAGE

REGISTERED APPRENTICES

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 16.79	$ 18.88	$ 21.00	$ 23.08	$ 25.20	$ 27.30	$ 29.89	$ 32.43
+ 1.41*	+ 1.58*	+ 1.76*	+ 1.94*	+ 2.11*	+ 2.29*	+ 2.46*	+ 2.64*

*This portion is not subject to overtime premiums.

Supplemental Benefits per hour:

Apprentices	
1st term	$ 19.37
2nd term	21.81
3rd term	24.21
4th term	26.65
5th term	29.06
6th term	31.48
7th term	33.42
8th term	35.40

Sheetmetal Worker 10/01/2022

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 4

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES
Per Hour: 07/01/2022

Sign Erector $ 53.79

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS
Per Hour: 07/01/2022

Sign Erector $ 53.33

OVERTIME PAY
See (A, F, S) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES
Per Hour:
6 month Terms at the following percentage of Sign Erectors wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
35%	40%	45%	50%	55%	60%	65%	70%	75%	80%

SUPPLEMENTAL BENEFITS
Per Hour:

07/01/2022

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 14.34	$ 16.26	$ 18.17	$ 20.10	$ 28.02	$ 30.47	$ 33.72	$ 36.27	$ 38.77	$ 41.29

4-137-SE

Sprinkler Fitter — 10/01/2022

JOB DESCRIPTION Sprinkler Fitter **DISTRICT** 1

ENTIRE COUNTIES
Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

Per hour	07/01/2022
Sprinkler Fitter	$ 48.98

SUPPLEMENTAL BENEFITS

Per hour	
Journeyperson	$ 29.13

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES
Wages per hour

One Half Year terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 23.70	$ 26.34	$ 28.72	$ 31.35	$ 33.99	$ 36.62	$ 39.25	$ 41.89	$ 44.52	$ 47.15

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 8.37	$ 8.37	$ 19.76	$ 19.76	$ 20.01	$ 20.01	$ 20.01	$ 20.01	$ 20.01	$ 20.01

1-669.2

Teamster - Building / Heavy&Highway — 10/01/2022

JOB DESCRIPTION Teamster - Building / Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Dutchess, Orange, Rockland, Sullivan, Ulster

WAGES
GROUP 1: LeTourneau Tractors, Double Barrel Euclids, Athney Wagons and similar equipment (except when hooked to scrapers), I-Beam and Pole Trailers, Tire Trucks, Tractor and Trailers with 5 axles and over, Articulated Back Dumps and Road Oil Distributors, Articulated Water Trucks and Fuel Trucks/Trailers, positions requiring a HAZMAT CDL endorsement.

GROUP 1A: Drivers on detachable Gooseneck Low Bed Trailers rated over 35 tons.

GROUP 2: All equipment 25 yards and up to and including 30 yard bodies and cable Dump Trailers and Powder and Dynamite Trucks.

GROUP 3: All Equipment up to and including 24-yard bodies, Mixer Trucks, Dump Crete Trucks and similar types of equipment, Fuel Trucks, Batch Trucks and all other Tractor Trailers, Hi-Rail Truck.

GROUP 4: Tri-Axles, Ten Wheelers, Grease Trucks, Tillerman, Pattern Trucks, Attenuator Trucks, Water Trucks, Bus.

GROUP 5: Straight Trucks.

GROUP 6: Pick-up Trucks for hauling materials and parts, and Escort Man over-the-road.

WAGES: (per hour)	07/01/2022	05/01/2023
GROUP 1	$ 34.28	$ 34.58
GROUP 1A	35.42	35.72
GROUP 2	33.72	34.02
GROUP 3	33.50	33.80
GROUP 4	33.39	33.69
GROUP 5	33.27	33.57
GROUP 6	33.27	33.57

NOTE ADDITIONAL PREMIUMS:
- On projects requiring an irregular shift a premium of 10% will be paid on wages. The premium will be paid for off-shift or irregular shift work when mandated by Governmental Agency.
- Employees engaged in hazardous/toxic waste removal, on a State or Federally designated hazardous/toxic waste site, where the employee comes in contact with hazardous/toxic waste material and when personal protective equipment is required for respiratory, skin, or eye protection, the employee shall receive an additional 20% premium above the hourly wage.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:		
First 40 hours	$ 42.16	$ 44.59
Over 40 hours	34.76	36.99

OVERTIME PAY
See (*B, E, **E2, ***P, X) on OVERTIME PAGE
*Holidays worked Monday through Friday receive Double Time (2x) after 8 hours.
**Makeup day limited to the employees who were working on the site that week.
***Sunday Holidays are paid at a rate of double time and one half (2.5x) for all hours worked.

HOLIDAY
Paid: See (5, 6, 15, 25) on HOLIDAY PAGE
Overtime: See (*1) on HOLIDAY PAGE
- Any employee working two (2) days in any calendar week during which a holiday occurs shall receive a days pay for each holiday occurring during said week. This provision shall also apply if a holiday falls on a Saturday or Sunday.
*See OVERTIME PAY section for when additional premium is applicable on Holiday hours worked.

11-445B/HH

Teamster - Delivery - Building / Heavy&Highway — 10/01/2022

JOB DESCRIPTION Teamster - Delivery - Building / Heavy&Highway **DISTRICT** 11

ENTIRE COUNTIES
Dutchess, Orange, Rockland, Sullivan, Ulster

WAGES

Group 1	Tractor Trailer Drivers
Group 2	Tri- Axle
Group 3	Senior Teamster

Wages:	07/01/2022	05/01/2023
Group 1	$ 33.20	$ 33.70
Group 2	29.20	29.70
Group 3	34.20	34.70

Hazardous/Toxic Waste Removal additional 20% when personal protective equipment is required

SUPPLEMENTAL BENEFITS

Per hour paid:		
First 40 hours	$ 31.50	$ 32.30
Over 40 hours	0.00	0.00

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 13, 15, 16, 20, 22, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 13, 15, 16, 20, 22, 25, 26) on HOLIDAY PAGE

- Employee must work either the scheduled day of work before or the scheduled day of work after the holiday in the workweek.
- Any employee working one (1) day in the calendar week during which a holiday occurs shall receive a day's pay for each holiday occurring during said week. This provision shall also apply if a holiday falls on a Saturday.
- When any of the recognized holidays occur on Sunday and are celebrated any day before or after the holiday Sunday, such days shall be considered as the holiday and paid for as such.

11-445 B/HH Delivery

Welder — 10/01/2022

JOB DESCRIPTION Welder **DISTRICT** 1

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
Per hour 07/01/2022

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(I)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays
(S)	Two and one half times the hourly rate for Holidays

(S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.

(T) Triple the hourly rate for Holidays

(U) Four times the hourly rate for Holidays

(V) Including benefits at SAME PREMIUM as shown for overtime

(W) Time and one half for benefits on all overtime hours.

(X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

(29) Juneteenth

New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By: (Check Only One) ☐ Contracting Agency ☐ Architect or Engineering Firm ☐ Public Work District Office Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone: ( ) Fax: ( )
E-Mail:

2. NY State Units (see Item 5)

- ☐ 01 DOT
- ☐ 02 OGS
- ☐ 03 Dormitory Authority
- ☐ 04 State University Construction Fund
- ☐ 05 Mental Hygiene Facilities Corp.
- ☐ 06 OTHER N.Y. STATE UNIT
- ☐ 07 City
- ☐ 08 Local School District
- ☐ 09 Special Local District, i.e., Fire, Sewer, Water District
- ☐ 1O Village
- ☐ 11 Town
- ☐ 12 County
- ☐ 13 Other Non-N.Y. State (Describe)

3. SEND REPLY TO ☐ check if new or change)
Name and complete address:

Telephone:( ) Fax: ( )
E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

- ☐ New Schedule of Wages and Supplements.
  APPROXIMATE BID DATE :
- ☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title _____

Description of Work _____

Contract Identification Number _____

Note: For NYS units, the OSC Contract No. _____

6. Location of Project:
Location on Site _____

Route No/Street Address _____

Village or City _____

Town _____

County _____

7. Nature of Project - Check One:

- ☐ 1. New Building
- ☐ 2. Addition to Existing Structure
- ☐ 3. Heavy and Highway Construction (New and Repair)
- ☐ 4. New Sewer or Waterline
- ☐ 5. Other New Construction (Explain)
- ☐ 6. Other Reconstruction, Maintenance, Repair or Alteration
- ☐ 7. Demolition
- ☐ 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- ☐ Construction (Building, Heavy Highway/Sewer/Water)
- ☐ Tunnel
- ☐ Residential
- ☐ Landscape Maintenance
- ☐ Elevator maintenance
- ☐ Exterminators, Fumigators
- ☐ Fire Safety Director, NYC Only
- ☐ Guards, Watchmen
- ☐ Janitors, Porters, Cleaners, Elevator Operators
- ☐ Moving furniture and equipment
- ☐ Trash and refuse removal
- ☐ Window cleaners
- ☐ Other (Describe)

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature

SEE PAGE TWO FOR LAWS RELATING TO PUBLIC WORK CONTRACTS

NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED ANY PUBLIC WORK CONTRACT

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: https://applications.labor.ny.gov/EDList/searchPage.do

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 10/21/2022

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****5754	0369 CONTRACTORS, LLC		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	*****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANGELO TONDO		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	*****2591	AVI 212 INC.		260 CROPSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	*****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023

NYSDOL Bureau of Public Work Debarment List 10/21/2022

Article 8

DOL	DOL	*****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCSO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	*****1143	CARMODY BUILDING CORP	CARMODY CONTRACTING AND CARMODY CONTRACTING CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	AG	*****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL	*****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	*****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	DOL	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025

NYSDOL Bureau of Public Work Debarment List 10/21/2022

Article 8

DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	AG		EDWIN HUTZLER		23 NORTH HOWELLS RD BELLPORT NY 11713	08/04/2021	08/04/2026
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	NYC	*****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FRANK BENEDETTO		19 CATLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL	*****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	NYC	*****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	*****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DOL	*****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	DOL	*****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JAMES LIACONE		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****7993	JBS DIRT, INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE	11/29/2019	11/29/2024

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DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN LUCIANO			05/14/2018	05/14/2023
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	AG	*****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL	*****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	AG	*****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DA	*****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	*****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL	*****2196	MAINSTREAM SPECIALTIES,		11 OLD TOWN RD	02/02/2021	02/02/2026

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DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL	*****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024
DOL	NYC	*****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	*****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DA	*****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	DOL	*****3684	NATIONAL LAWN SPRINKLERS, INC.		645 N BROADWAY WHITE PLAINS NY 10603	05/14/2018	05/14/2023
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTION, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	NYC	*****5643	NYC LINE CONTRACTORS, INC.		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL	*****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	AG	*****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DA	*****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE	10/01/2020	10/01/2025

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DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	*****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	*****9148	RICHARD TIMIAN	RICH T CONSTRUCTI ON	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	*****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DOL	*****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	*****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	*****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RDPOMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	NYC	*****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	*****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL	*****2045	SCOTT DUFFIE	DUFFIE'S ELECTRIC, INC.	P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	DOL		SCOTT DUFFIE		P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	NYC	*****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	*****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE	03/20/2019	03/20/2024

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DOL	DOL	*****0816	SOLAR ARRAY SOLUTIONS, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	*****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC	*****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	*****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	*****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL	*****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	*****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	*****6789	TEST1000		P.O BOX 123 ALBANY NY 12044	03/01/2021	03/01/2026
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DA	*****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****8210	UPSTATE CONCRETE & MASONRY CONTRACTING CO INC		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL	*****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	*****2426	VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		VIKTAR PATONICH		2630 CROPSEY AVE	10/30/2018	10/30/2023

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DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM G. PROERFRIEDT		85 SPRUCEWOOD ROAD WEST BABYLON NY 11704	01/19/2021	01/19/2026
DOL	DOL	*****5924	WILLIAM G. PROPHY, LLC	WGP CONTRACTIN G, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL	*****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Multiple Work Packages.
4. Work under Owner's separate contracts.
5. Contractor's use of site and premises.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.
9. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: 42051.

1. Project Location: 106 Hammond Road, Thiells, New York, 10984, United States.

B. Owner: NRCSD, 65 Chapel Street, Garnerville, 10923, United States.

1. Owner's Representative: Paul Rooney, Director of Facilities III.

C. Architect: Michael Shilale Architects, LLP, 140 Park Avenue, New City, New York, 10956.

1. Architect's Representative: MSA Architects, LLP.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. MEP & Structural : GPI Engineering .

2. Landscape Architect: The LA Group

E. Contractor: to be selected has been engaged as Contractor for this Project.

F. Construction Manager: Palombo Group .

1. Construction Manager Representative: Lou Rodriguez .
2. Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for construction between Owner and each Contractor, according to a separate contract between Owner and Construction Manager.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. NRCSD High School Phase 1 Projects Turf field installation, bleacher modifications, press box demolition, press box/concession stand new construction, Rooftop HVAC replacement, Weight room and training room reconstruction, and other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under coordinated, concurrent multiple contracts. See Section 011200 "Multiple Contract Summary" for a list of multiple contracts, a description of work included under each of the multiple contracts, and the responsibilities of Project coordinator.

1.6 WORK UNDER OWNER'S SEPARATE CONTRACTS

A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.

1. <**Insert name of the Contract>** : To <**Insert name of Owner's separate Contractor>** [**to**] [**for**] <**Insert a brief description of work performed under Owner's separate contract>**.

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Each Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits on Use of Site: Confine construction operations to work area defined on drawings .
2. Driveways, Walkways and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to between 7 a.m. to 4 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.

1. Weekend Hours: with approval by the owner .
2. Early Morning Hours: with approval by the owner .
3. Work in Existing Building: not permitted while school is in session .
4. Hours for Utility Shutdowns: to be coordinated with the owner 48 hours in advance .
5. Hours for Core Drilling or loud activities : to be coordinated with owner 48 hours in advance .

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Construction Manager's written permission before proceeding with utility interruptions.

D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.

1. Notify Construction Manager not less than two days in advance of proposed disruptive operations.
2. Obtain Construction Manager's written permission before proceeding with disruptive operations.

E. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Owner's property is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 01 1200 - SUMMARY OF PROJECT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the General and Supplemental Conditions and Division 1 Specification Section, apply to this Section.

1.2 SUMMARY

A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.

B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.

C. Related Requirements:

1. Section 011000 "Summary" for the Work covered by the Contract Documents, restrictions on use of Project site, phased construction, coordination with occupants, and work restrictions.
2. Section 013100 "Project Management and Coordination" for general coordination requirements.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures equivalent in weather protection to permanent construction.

1.4 PROJECT COORDINATOR

A. Project coordinator shall be responsible for coordination between the General Construction Contract, Plumbing Contract, HVAC Contract, Electrical Contract, and Site Contract.
1. General Contractor will act as the project Coordinator for General Construction, at the High School Building, Concession/Press box Building, Fieldhouse Building, and coordination with MEP for tasks which General contractor is coordinator for.

2. Site Contract will act as the project Coordinator for all Site Contract items. All field construction, bleacher modifications, all site utilities and coordination with MEP for tasks which site contractor is coordinator for.

1.5 COORDINATION ACTIVITIES

A. Coordination activities of Project coordinator include, but are not limited to, the following:

1. Provide overall coordination of the Work.
2. Coordinate shared access to workspaces.
3. Coordinate product selections for compatibility.
4. Provide overall coordination of temporary facilities and controls.
5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
6. Coordinate construction and operations of the Work with work performed by each Contract and Owner's construction forces and separate contracts.
7. Prepare coordination drawings in collaboration with each contractor to coordinate work by more than one contract.
8. Coordinate sequencing and scheduling of the Work. Include the following:

a. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
b. Prepare a combined contractors' construction schedule for entire Project. Base schedule on preliminary construction schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.

1) Submit schedules for approval.
2) Distribute copies of approved schedules to contractors.

9. Provide photographic documentation.
10. Provide quality-assurance and quality-control services specified in Section 014000 "Quality Requirements."
11. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
12. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
13. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
14. Provide field surveys of in-progress construction and site work and final property survey.
15. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
16. Coordinate cutting and patching.
17. Coordinate protection of the Work.
18. Coordinate firestopping.
19. Coordinate completion of interrelated punch list items.
20. Coordinate preparation of Project record documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
21. Print and submit record documents if installations by more than one contractor are indicated on the same contract drawing or shop drawing.
22. Collect record Specification Sections from contractors, collate Sections into numeric order, and submit complete set.
23. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

B. Responsibilities of Project coordinator for temporary facilities and controls include, but are not limited to, the following:

1. General Contract shall provide common-use field office for use by all personnel engaged in General construction activities.
2. Site Contract shall provide common-use field office for use by all personnel engaged in Site construction activities.

1.6 THE CONTRACT

A. The Project will be constructed under a multiple prime contracting arrangement with the Owner awarding and holding the separate Contracts. Each contractor shall furnish all labor, material, tools, equipment, supervision, layout, delivery, trucking, shop drawings, submittals, etc. necessary to complete the work described in the Division of Work of their respective Contracts, and based upon a complete set of Contract Documents.

B. Scope of work for each Prime Contractor is defined in Section 011200 and takes precedence over all drawing notes that may refer to scoping.

C. Each Contractor has been given the opportunity prior to bid to inspect the entire Project site for interferences to their Contract work, and agrees to accept the site as it exists on the date of the bid opening.
1. It is the Owner's intention to continue to occupy the existing buildings and site for normal School operations during the Construction process. The Contractors all agree to:

a. Cooperate with the Owner's personnel in maintaining and facilitating access to the School buildings and its facilities by the School staff, Students, Owner's agents, service consultants and the public, throughout the construction process.

b. Keep driveways and entrances serving the occupied School buildings clear and available to the Owner, the Owner's employees, the public, and to emergency vehicles at all times. Do not obstruct access to, or use these areas for parking, staging of equipment or materials. All access through these existing areas must be coordinated in advance and in accordance with the Owner's usage and occupancy schedule.

c. Schedule construction operations so as to minimize any conflicts or interruptions to the daily school functions. Coordinate any necessary interruptions with the designated project representative.

d. All existing Owner occupied buildings (not turned over to the Project Contractors) need to remain operational at all times. The contractors are responsible to maintain all systems, such as but not limited to: fire alarm, clocks, electric, public address system, gas service, heat etc.

D. Each Prime Contractor shall:

1. **Strive to maintain a safe environment for its employees, clients and vendors. The prime contractors efforts for an effective response to the Novel Coronavirus (COVID-19) Pandemic will be guided by and in accordance with all applicable federal, state and local laws and guidelines issued by public health authorities such as the Centers for Disease Control and other governmental agencies.**

2. Provide field-engineering services, in addition to those provided by the Site Work Prime Contract, to install site utilities included in the applicable Prime Contract.

3. Coordinate construction schedule information in order to formulate one master schedule for the entire Project.

4. Provide reflective vests to be worn by all on-site personnel at all times.

5. Provide erosion and Sediment Control, and dewatering as it relates to any excavation associated with its own Prime Contract.

6. Provide sanitary hand solution and potable drinking water for its own employees.

7. Provide access to all concealed systems as required for system maintenance and repair for items installed in their Prime Contract.

8. Provide and maintain material lifting equipment required for the completion of their Contract requirements, and complying with NYS Labor Laws, OSHA Regulations, and other Federal, State, and local laws.

9. Provide and maintain additional temporary stairs, ladders, ramps, scaffolding, and platforms required specifically for completion of work of their own Contract, and as further detailed in this section. All work needs to comply with the NYS Labor Laws, OSHA regulation, and other Federal, State, and local laws.

10. Provide Fire Prevention materials and equipment for fire protection related to the work of their own Prime Contract. Provide fire extinguishers, fire blankets, and fire watch during all cutting and welding operations.

11. Provide any supplemental lighting required to install the work of its own Contract, beyond the minimum OSHA levels provided under the Electrical Work Prime Contract.

12. Provide any supplemental heat required to install the work of its own Contract, beyond the levels owed by the Site Work Contractor.

13. Provide traffic control for deliveries, and equipment needed to perform the work of their own Prime Contract.

14. Provide protection of its own finished Work, after installation, until accepted by the Owner.

15. Provide fire caulking for any penetration related to the work for its own Prime Contract.

16. Provide any office and storage trailers required to complete the work of their own Prime Contract.

17. Provide for a thorough final cleaning of the site, building, and equipment provided under their Prime Contract immediately before the final inspection. Each Prime Contractor is responsible for cleaning and dust and debris generated from the work of their own Contract.

    a. Maintain areas in a cleaned condition until the Owner occupies the space.
    b. Personnel: Experienced workman or professional cleaners approved by the Architects

1.7 SUMMARY OF WORK

A. The work will be constructed under multiple prime contracts. One set of contract documents is issued covering the multiple contracts. Each Prime Contract is defined as:

1. CONTRACT 1 GC – GENERAL CONSTRUCTION WORK
2. CONTRACT 2 SC – SITE CONSTRUCTION WORK
3. CONTRACT 3 EC – ELECTRICAL CONSTRUCTION WORK
4. CONTRACT 4 PC – PLUMBING CONSTRUCTION WORK
5. CONTRACT 5 HC – HVAC CONSTRUCTION WORK

1.8 WORK UNDER SEPARATE CONTRACTS

A. The project will be constructed under a multiple-prime contracting arrangement

B. One set of documents is issued covering all multiple prime contracts. Each prime contractor is to review ALL drawings and specifications for complete understanding and knowledge of the work.

C. The following Contract Documents are specifically included and defined as integral to each Prime Contract.

1. Bidding Requirements
2. Performance and Payment Bonds
3. Conditions of the Contract, including

    a. General Conditions & Supplementary Conditions
    b. Insurance Requirements
    c. NYS Prevailing Wage Rates.

D. Extent of Contract: Unless the Contract Documents contain a more specific description of the Work, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.

1. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.

2. The Site Work Contract shall provide shoring, bracing, excavation and backfill for all other contractors. Trenches, excavation, fill and compaction for the Work of all contracts shall be provided by the Site Work Contract. Site work contractor is to refer to all Mechanical, Electrical and Plumbing drawings for locations of utilities requiring shoring, bracing, excavation and backfilling. The General contract shall be responsible for foundation excavation/backfill at the Concession/Press box building and the Field House.

3. Provide all cutting & patching associated with the Work of its Prime Contract. All patching is to be performed by mechanics qualified and experienced with the materials and finishes being patched, and hired by the responsible Prime Contractor.

4. Firestopping for the Work of each contract shall be provided by each contract for its own Work. Firestopping shall comply with Division 7 Section “Penetration Firestopping”

5. Lead Based Paint precautions for the Work of each contract shall be provided by each contract for its own Work. Each Prime Contractor shall provide procedures for OSHA Lead precautions.

6. Each Prime Contractor shall designate a full time superintendent to supervise the work of the Prime Contractor, who shall always be present on the job site when work is being performed; this person shall be familiar with Project and authorized to conclude matters relating to progress. This person shall also represent their company at weekly contractor meetings.

7. Termination and removal of its temporary facilities shall be provided by each contract for its own Work.

E. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 1 Section 01500 "Temporary Facilities and Controls," each Contract is responsible for the following:

1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility

2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.

3. Its own field office complete with necessary furniture, utilities, and telephone service.

4. Its own storage and fabrication sheds.

5. Temporary heat for construction at isolated work areas if required.

6. Temporary enclosures for its own construction activities.

7. Hoisting requirements for its own construction activities.

8. Each Prime Contractor is to stockpile his debris on a daily basis and place it in the dumpster. Dumpsters will be provided by each Contractor for their own work. Prime contractors will endeavor to recycle materials daily.

9. Secure lockup of its own tools, materials, and equipment.

10. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

11. Safety procedures as dictated by the district, OSHA, and the NYS Department of Labor.

12. Labor for daily clean-up.

1.9 CONTRACT 1 - GENERAL CONSTRUCTION WORK:

A. The Work of the General Construction Work Contract includes but is not limited to, the following descriptions:

1. Includes Architectural, Structural, Masonry, Flooring, Ceilings, Casework, plus other construction operations traditionally recognized as General Work Construction. It also includes Administrative and coordination responsibilities. This includes, but is not limited to, *all work shown* on the following:
   a. Drawings:
      1) All “B” series Drawings (Code Plans)
      2) All “AA” series Drawings (Asbestos Abatement)
      3) All “C” series Drawings (Civil Drawings), *as it relates to the construction of the concession building*
      4) All “D” and “SD” series Drawings (Demo Plans)
      5) All “S” series Drawings (Structural Plans)
      6) *All “A” series Drawings (Architectural*)
      7) Review “M,E,P” drawings for the purposes of coordination.

2. Coordination:

    a. General Work Contractor is to pay particular attention to coordination of work at all flooring replacement with the state flooring contract. Coordination with the work of all of the other prime contractors.

3. Demolition:

    a. Asbestos containing material removal as shown in the contract documents and disposal per Code Rule 56.
    b. Construction of hard barriers separating abatement areas from all other areas.
    c. Contractor is asked to make every effort to visit the site to review existing conditions prior to bidding the project. A sign in sheet will be kept to verify compliance with this request.
    d. Removal of masonry walls, doors, and interior partitions.
    e. Removal of finishes noted on plans.
    f. Removal and disposal of miscellaneous equipment including all existing wall mounted specialty items and/or equipment not shown if impacting work to be demolished.
    g. All cutting and patching necessary for work of this contract, including layout, sleeves, coring, debris removal, sawcuts, providing lintels, drywall work, plaster work, grouting, painting, ceiling removal and replacement, etc.

4. Temporary Facilities

    a. Provide dust protection.
    b. Provide continuous exits.
    c. Provide temporary plywood protection at all existing openings to be replaced and new openings that are to be performed by the General Work Contractor. Assure the interior of the building is not exposed to the outside elements. All openings to be kept water tight at all times.
    d. Provide Temporary Facilities indicated as Work of this Contract in Division 1 Section 01 50 00, “Temporary Facilities and Controls”

5. New Construction:

    a. **In existing construction**, each Prime Contractor is to provide their own rough opening in walls, and floors, including lintels and any required structural framing for penetrations as part of their own Prime Contract. All lintels and / or framing are to be sized in accordance with the lintel schedules and standard details within the contract documents unless specifically shown to be under the General Construction Contract. Installation is to be performed by a mechanic qualified and experienced with the materials and finishes being altered or installed. Submit to the Construction Manager the name and qualification of the subcontractor performing the installation prior to starting the work.
    b. The General contract shall be responsible for foundation excavation/backfill at the Concession/Press box building and the Field House.
    c. Foundations, including footings, foundation walls foundation repair.
    d. Slabs-on-grade, (earthwork by site contractor), insulation, and finishes.
    e. Below-grade building construction, and thermal and moisture protection,
    f. Superstructure, including floor and roof construction and board fire protection.
    g. Exterior closure, including walls, doors, windows, and louvers.
    h. Roofing, including coverings, flashings roof specialties and glazed openings.
    i. Roof patching when not required by other trades. (High School RTU’s roof curb flashing will be by HVAC Contract)
    j. Provide repairs to masonry and concrete structures and openings.
    k. Interior construction, including partitions, doors, interior glazed openings, and fittings.
    l. Fire-protection specialties.
    m. Provide concrete and masonry.
    n. Provide self-leveling underlayment where required to allow for acceptable flooring installation by state contract. Contractor shall anticipate that all existing areas to receive new flooring shall require both light grinding and self-leveling underlayment.
    o. Provide rough and finish carpentry.
    p. Provide architectural woodwork.
    q. Provide doors and hardware, frames, and electric hardware. Power for electrical hardware to be provided by the Electrical Contractor.

r. Provide gypsum wallboard and finishing for same.
s. Provide access doors that are shown on Architectural drawings.
t. Miscellaneous items, including concrete equipment bases painting of mechanical and electrical work.
u. Items not covered in each trade description (section 1.10, 1.11, 1.12 and 1.13) identified on any drawing or in any specification section, are the responsibility of the general construction contractor.
v. File, pay for, and obtain all required permit, inspections and approvals.
w. Provide building paper protection over finished product. Include maintenance of protection and removal of paper.

6. Provide multiple shift work as needed to complete work as shown on milestone schedule.

B. The Work of the General Construction Contract includes but is not limited to the Work that is specified in the Project Manual(s) and as shown on the drawings that form the contract plans. The Contractor is directed to examine all drawings since certain details and/or notes may appear anywhere therein that apply to his/her particular work. This prime contract is defined as, and includes, all Sections in the Divisions indicated by reference, and specific Sections noted:

1. Division 0 –Procurement and Contracting Requirement, all Sections.
2. Division 1 –General Requirements, all Sections, including Temporary Facilities indicated.
3. Division 2 – Existing Conditions, all Sections
4. Division 3 – Concrete, all Sections.
5. Division 4 – Masonry, all Sections.
6. Division 5 – Metals, all Sections.
7. Division 6 – Woods, Plastics and Composites, all Sections
8. Division 7 –Thermal and Moisture Protection, all Sections *EXCEPT FOR SECTION 071800 – TRAFFIC COATINGS / PEDESTRIAN TRAFFIC*
9. Division 8 – Openings, all Sections.
10. Division 9 – Finishes, all Sections.
11. Division 10 – Specialties, all Sections, *EXCEPT FOR SECTION 101453 - TRAFFIC SIGNAGE AND SECTION 107500 – FLAGPOLES*

1.10 CONTRACT 2 – SITE WORK CONSTRUCTION

A. The Work of the Site Work Contract, includes but is not limited to, the following descriptions:

1. Landscape, Site plus other construction operations traditionally recognized as Site Work Construction. This includes, but is not limited to, *all work shown* on the following:

    1) All “B” series Drawings (Code Plans, Boundary and Topographic Survey)
    2) Drawings: All “C” series Drawings (Civil) – Bleacher and Concession / Press Box drawings are for coordination purposes.
    3) All “S” series Drawings (Structural Plans)
    4) *All “A” series Drawings (Architectural*)

    Drawings: All “P, E” series Drawings (Plumbing / Electrical) – as it pertains to digging and trenching work required for this prime.

2. Coordination:

    a. Coordination with the work of all of the other contractors including but not limited to the synthetic turf state contractor, the rubber track state contractor, athletic field lighting state contractor, and the bleacher / press box state contractor.

3. Demolition:

    a. Removal of curbing, roadways, bituminous paving, and concrete walks
    b. Removal and relocation of trees, shrubs and ground cover.
    c. Removal of all underground utilities and/or equipment as shown or described.
    d. Removal of existing sports fields, track and associated utilities.
    e. Removal of existing surfacing and fencing.
    f. Removal of existing bleachers and associated structures.

g. Removal of existing light pole bases to be replaced.
h. Removal and disposal of miscellaneous equipment including equipment not shown if impacting work to be demolished.
i. Removal of unsuitable fill including rock shown in Geotech report to suitable depth

4. Temporary Facilities

a. Provide temporary silt fencing around athletic field areas being renovated.
b. Provide temporary roads/ access and continuous exits in and out of all construction areas.
c. Provide all necessary erosion control measures specific to renovation of the athletic fields and parking / circulation. See drawings and specifications for SWPP requirements.
d. Provide wash out area for construction vehicles.
e. Prime Contractor is to stockpile his debris on a daily basis, and place it in the dumpster.
f. Provide Temporary Facilities indicated as Work of this Contract in Division 1 Section 01500, "Temporary Facilities and Controls"

5. New Construction:

a. Provide excavations and earthwork including topsoil stripping, stockpiling and fill for the Site Work Contract. Provide shoring, bracing, excavation and backfill for all other contractors.
b. Provide site work related to the all utility upgrades. Coordinate shutdowns with the Owner and Construction Manager.
c. Provide site work related to all sports field events including but not limited to the following:
    1) Football Field including any associated storm and irrigation systems. ***The Synthetic Carpet and Installation will be purchased off state contract. The site contractor will be responsible for all subbase and infrastructure associated with the new synthetic field. The site work contractor is responsible for all work except for the synthetic carpet and installation of carpet. Final acceptance of subbase and field planarity from synthetic carpet manufacturer will be required prior to installation.***
    2) ***The Rubber Track Installation will be purchased off of state contract. The site contractor will be responsible for all asphalt subbase and infrastructure associated with the new rubber track and rubber required at field events***. Coordinate synthetic track surfacing installation with rubber and carpet contractors.
    3) ***Bleachers / ADA Ramps to be purchased off of state contract. Strict coordination will be required during shop drawing process and final installation. The foundations associated with the Bleachers and ADA Ramps will be provided by the Site contract.***
    4) Sports field lighting is to be purchased off of state contract. Strict coordination will be required during shop drawing process and final installation. Layout of the sports field lighting will need to be approved by both parties prior to installation.
d. All site drainage improvements.
e. All excavation/backfill and installation of fire water service.
f. All excavation/backfill installation and connections of domestic water service to concession building Plumbing at point 5ft outside of buildings.
g. All excavation/backfill for installation electrical conduits.
h. Excavation for all trades. The General contract shall be responsible for foundation excavation/backfill at the Concession/Press box building and the Field House
i. Test all site installed systems.
j. Test all factory installed systems.
k. Provide concrete sidewalks, asphalt paving, final landscaping, site appurtenances and curbing. Provide driveway and parking lot paving and drainage as shown.
l. Provide suitable fill to replace unsuitable fill.
m. Provide all storm water improvements. Provide underground storm systems.
n. Provide all site fencing and landscaping
o. Provide construction entrance.
p. Provide standard duty access roads.
q. The Site Work Contract shall perform all necessary excavation, backfilling, and compaction and field required concrete. The electrical work contractor will provide conduit and manholes for electrical duct bank and data / security bank only.
r. Provide excavation and backfill and installation for concrete light pole bases provided by the State contractor. Coordinate installation.
s. Provide:

1) All site signage, see temporary facilities section
2) Erosion controls and all necessary documentation and regular inspections of erosion control.
3) Contractor shall obtain and pay for any permits, inspections, or certifications from governing authorities having jurisdiction over the work to be performed, or over the finished product to be installed by this Contractor. Project Building Permit is by others.

6. General Requirements, including but not limited to, additional items specifically indicated as the Work of this Contract.

B. The Work of the Site Work Contract includes but is not limited to the Work that is specified in the Project Manual(s) and as shown on the drawings that form the contract plans. The Contractor is directed to examine all drawings since certain details and/or notes may appear anywhere therein that apply to his/her particular work. This prime contract is defined as, and includes, all Sections in the Divisions indicated by reference, and specific Sections noted:

1. Division 1 –General Requirements, all Sections, including Temporary Facilities indicated.
2. Division 2 – Existing Conditions - all Sections as it pertains to site work
3. Division 3 – Concrete - all Sections, as it pertains to site work.
4. Division 7 – Thermal and Moisture Protection – as it pertains to joint sealants Section 071800 - *TRAFFIC COATINGS / PEDESTRIAN TRAFFIC*
5. Division 10 – Specialties – *SECTION 101453 - TRAFFIC SIGNAGE AND SECTION 107500 – FLAGPOLES*
6. Division 11 – Equipment – Section 116833 Athletic Field Equipment and Section 116843 Exterior Scoreboards
7. Division 13 – Special Construction – all Sections ***as It pertains to the coordination of the new bleachers and ADA ramp system. The new bleachers / ADA Ramp and associated foundations will be by the Site Contract. Strict coordination will be required.***
8. Division 26 – Electrical – all Sections as it pertains to required site trenching.
9. Division 31 – Earthwork – all Sections
10. Division 32 – Exterior Improvements – all Sections, ***except for Section 32 1813 Synthetic Turf and Section 32 1823 Synthetic Track Surfacing. The new synthetic turf and synthetic track surfacing including installation will be purchased off of state contract by the Owner. Strict coordination will be required.***
11. Division 33 – Utilities – all Sections

C. The Site Work Contract is responsible for installation of and maintenance of all Temporary Erosion and Sediment Control measure for the duration of the project as specified and associated Pollution Control for SPDES Sites."

1.11 CONTRACTS 3 - ELECTRICAL WORK CONTRACT

A. Work of this Contract includes, but is not limited to, the following descriptions:

1. Includes Electrical Distribution Service, Athletic Field Lighting, Athletic Field Communications, Fire Alarm, Intercom Systems, Security Systems, general site lighting, and other systems traditionally recognized as Electrical work. This includes but is not limited to, all work shown on the "E", "ED" and "FA" Drawings.

2. Coordination:

   a. Coordination with the work of all of the other contractors.

3. Demolition:

   a. Removal of items as shown and/or required.
   b. Removal of site lighting fixtures and wiring.
   c. All cutting and patching necessary for work of this contract, including layout, sleeves, coring, debris removal, sawcuts, lintels (furnish and install), drywall work, plaster work, grouting, painting, ceiling removal and replacement, etc.

4. Temporary Facilities

a. Provide Temporary Facilities indicated as Work of this Contract in Division 1 Section 01500, "Temporary Facilities and Controls"

5. Construction:

a. Provide electric to new sports field lighting. Musco Lighting to be provided through State contract.
b. Supply and install all electrical materials, devices and equipment for the project.
c. Supply and install complete electrical service from source to factory installed transformers, MDP, electrical panels, wiring, and devices.
d. Supply and install electrical heaters.
e. Supply and install all conduits, wiring from existing High School to new concession stand and field house
f. Remove and reinstall all wiring to existing score board in new press box.
g. Supply and install RTU disconnects and make electrical connections.
h. Supply and install RTU maintenance receptacles and make electrical connections.
i. Supply and install all interior light fixtures.
j. Supply and install all exterior lights.
k. Supply and install all exit lights and emergency lighting.
l. Test all site installed systems.
m. Test all factory installed systems.
n. Provide all fire alarms, security conduit only, CATV, wireless clock system, public address sound system, and networking systems as shown.
o. Provide all necessary wiring associated with the modular press box.
p. Provide all fees required for inspections and permits.
q. Provide all site lighting wiring and fixtures including any necessary cutting and patching.
r. The electrical work contractor will be responsible for the electrical duct bank installation as follows: The site work contractor will perform all necessary excavation, backfilling and compaction. The electrical work contractor will provide and install conduit and manholes for electrical ductbank and data bank. The site work contractor to supply light pole bases.
s. Provide support framing for Electrical equipment and conduits.
t. Provide firestopping and sealing all electrical penetrations
u. Provide owner training
v. Provide control wiring and connection for electrified door hardware

6. General Requirements, including but not limited to, additional items specifically indicated as the Work of this Contract.
7. Provide second shift work as needed to complete work as shown on milestone schedule.

B. The Work of the Electrical Work Contract includes but is not limited to the Work that is specified in the Project Manual(s) and as shown on the drawings that form the contract plans. The Contractor is directed to examine all plan drawings since certain details and/or notes may appear anywhere therein that apply to his/her particular work. This prime contract is defined as, and includes, all Sections in the Divisions indicated by reference, and specific Sections noted:

1. Division 1 –General Requirements all Sections, including Temporary Facilities indicated.
2. Division 8 – Openings – review all sections as required for the scope of this contract.
3. Division 11 – Equipment – review all sections as required for the scope of this contract.
4. Division 26 - Electrical - All Sections, except *265868 EXTERIOR ATHLETIC LIGHTING*, exterior athletic lighting is for reference and coordination with supply power.
5. Division 28 – Security & Fire Alarm Systems

1.12 CONTRACT 4 - PLUMBING WORK CONTRACT

A. This prime contract is defined as, and includes, Drawings and Specifications as indicated by reference, and any other construction operations traditionally recognized as Plumbing Construction Work.. This includes but is not limited to, all work shown on the "P" and "PD" Drawings.

1. Coordination:

a. Coordination with the work of all the other contractors.

2. Demolition:

a. Removal of items as shown and/or required. Coordinate shutoffs with CONSTRUCTION MANAGER, DISTRICT and General Contractor during demolition.
b. All cutting and patching necessary for work of this contract, including layout, sleeves, coring, debris removal, saw cuts, lintels (furnish and install), drywall work, plaster work, grouting, painting, ceiling removal and replacement, etc.

3. Temporary Facilities

a. Provide Temporary Facilities indicated as Work of this Contract in Division 1 Section 01 50 00, “Temporary Facilities and Controls”

4. Construction:

a. **In existing construction**, each Prime Contractor is to provide their own rough opening in walls, and floors, including lintels and any required structural framing for penetrations as part of their own Prime Contract. All lintels and / or framing are to be sized in accordance with the lintel schedules and standard details within the contract documents unless specifically shown to be under the General Construction Contract. Installation is to be performed by a mechanic qualified and experienced with the materials and finishes being altered or installed. Submit to the Construction Manager the name and qualification of the subcontractor performing the installation prior to starting the work.
b. The General Construction Work Contract shall perform all necessary trenching, excavation, backfilling, compaction and field required concrete for all other primes within the delineated General Construction Work area unless noted otherwise.
c. Supply all materials/labor to make all hot & cold water connections and insulate.
d. Provide/Install fixtures and make water & sanitary connections.
e. Supply all materials to extend cold water service line from the new concession stand building to the existing building and make connections at both points.
f. Test all fixtures, including water heaters and bottle fillers as required by local/state code.
g. Make repairs and/or adjustments as required to provide working fixtures.
h. Supply all materials, labor, equipment, and tools to manifold all sanitary drops and extend piping to manhole and connection to existing sanitary line. Include manhole/ cleanouts as indicated on the drawings.
i. Heat tape & insulate as required by local codes.
j. Test domestic water and sanitary systems as required by local/state code.
k. Install all gas piping from source and connect as required.
l. Supply and install all necessary blocking, anchors and hangers to support and secure gas piping on the roof.
m. Make tie-in to gas source.
n. Paint piping as required by local/state code.
o. Purge system and start all gas operated equipment.
p. Gas piping contractor to coordinate tie-in location, pressure requirements, etc. with local gas provider.
q. All fire service work will be by site contractor.
r. All domestic water, to a point 5ft outside the building will be by pluming contract
s. All fees required for inspections and permits.
t. Provide support framing for plumbing equipment.
u. Furnish access doors for plumbing access and foundation sleeves for underground piping (to be installed by GC)
v. Provide firestopping and sealing at all plumbing penetrations.
w. Provide owner training / commissioning of equipment.

5. Provide multiple shift work as needed to complete work as shown on milestone schedule. Schedule shows a significant amount of work to be performed second shift.

B. The Work of the Plumbing Work Contract includes but is not limited to the Work that is specified in the Project Manual(s) and as shown on the drawings that form the contract documents. The Contractor is directed to examine **ALL** drawings and specifications since certain details and/or notes may appear anywhere therein that apply to his/her particular work.
1. Specifications:
a. Division 0 – Procurement and Contracting Requirement, all Sections.
b. Division 1 – General Requirements all Sections, including Temporary Facilities indicated.

c. Division 2, 3, 5 & 9 – Section 02 41 19, Selective Structure Demolition, Section 03 30 00, Cast-in-Place Concrete, Section 05 50 00, Metal Fabrications and Section 09 91 00, Painting as they relate to cutting and patching.
d. Division 7 – Section 07 84 13, Penetration Firestopping and Section 07 92 00, Joint Sealants as required for the Work of this Contract.
e. Division 22 – Plumbing, all Sections.

1.13 CONTRACT 5 - HEATING, VENTILATING, & AIR CONDITIONING WORK CONTRACT

A. This prime contract is defined as, and includes, Drawings and Specifications as indicated by reference, and any other construction operations traditionally recognized as heating, ventilating and cooling work. This includes but is not limited to, all work shown on the "M" and "MD" Drawings.

1. Coordination:

a. Coordination with the work of all of the other contractors.

2. Demolition

a. Provide demolition of all HVAC equipment and piping as shown and as required at the existing building including in crawl spaces and pipe tunnels. See construction documents for extent of work.
b. Remove and properly dispose of air dampers, actuators and control tubing shown to be removed.
c. All cutting and patching necessary for work of this contract, including layout, sleeves, coring, debris removal, saw cuts, lintels (furnish and install), drywall work, plaster work, grouting, painting, ceiling removal and replacement, etc.

3. Temporary Facilities

a. Provide Temporary Facilities indicated as Work of this Contract in Division 1 Section 01 50 00, "Temporary Facilities and Controls"

4. Construction:

a. **In existing construction**, each Prime Contractor is to provide their own rough opening in walls, and floors including lintels and any required structural framing for penetrations as part of their own Prime Contract. All lintels and / or framing are to be sized in accordance with the lintel schedules and standard details within the contract documents unless specifically shown to be under the General Construction Contract. Installation is to be performed by a mechanic qualified and experienced with the materials and finishes being altered or installed. Submit to the Construction Manager the name and qualification of the subcontractor performing the installation prior to starting the work.
b. The General Construction Work Contract shall perform all necessary trenching and excavation, backfilling, and compaction and field required concrete for all other primes within the delineated General Construction Work area unless noted otherwise.
c. Curbs, RTUs Split-System's and accessories.
d. RTU's will be hoisted onto the roof by HVAC contract.
e. Assemble roof curbs, set in place, anchor and flash to roof structure.
f. Roof flashing for HS RTU's will be by HVAC Contract.
g. Supply and install galvanized supply and return curb transitions.
h. Supply and install all interior and exterior ductwork, registers and diffusers.
i. Install RTUs onto curbs and weather-tight.
j. Install all RTU accessories, including filters.
k. Install thermostats and make connections at RTUs and thermostats.
l. Program thermostats for heat, cooling and occupied & unoccupied times.
m. Start up and test RTUs, Split system for heat, cooling and fresh air.
n. Adjust all volume dampers and diffusers to provide proper air flow.
o. Make all ductwork connections for fans.
p. Install Wall mounted ac/ heaters.
q. Install all control components into air and hydronic systems as required maintaining the integrity of the system:

1) Install motor actuated dampers.
2) Install airflow measuring stations.
3) Install airside temperature and pressure sensors.
4) Install hydronic control valves.
5) Install hydronic temperature and pressure sensor wells.
6) Provide personnel to assist with commissioning work of the EMCS as required for controls of the work of this contract. Testing, Adjusting and Balancing for HVAC.

r. Provide contractor filters, final replacement filters and final duct cleaning.
s. Provide and install all insulation, painting and labeling of new and modified piping, ductwork and equipment.
t. All fees required for inspections and permits.
u. Provide support framing for HVAC equipment, i.e. mechanical equipment curbs.
v. Furnish access doors for HVAC access (to be installed by GC)
w. Provide firestopping and sealing at all HVAC penetrations
x. Furnish motor controllers/disconnects to Electrical Contract for installation and wiring.
y. Provide the necessary layout for all roofing penetrations to the General Work Contractor for any required structural steel supports.
z. Provide owner training / commissioning of equipment.

5. Provide multiple shift work as needed to complete work as shown on milestone schedule. Schedule shows a significant amount of work to be performed second shift.

B. The Work of the HVAC Work Contract includes but is not limited to the Work that is specified in the Project Manual(s) and as shown on the drawings that form the contract documents. The Contractor is directed to examine **ALL** drawings and specifications since certain details and/or notes may appear anywhere therein that apply to his/her particular work.

1. Specifications:
a. Division 0 –Procurement and Contracting Requirement, all Sections.
b. Division 1 –General Requirements all Sections, including Temporary Facilities indicated
c. Division 2, 3, 5 & 9 – Section 02 41 19, Selective Structure Demolition, Section 03 30 00, Cast-in-Place Concrete, Section 05 50 00, Metal Fabrications and Section 09 91 00, Painting as they relate to cutting and patching.
d. Division 7 –Section 07 84 13, Penetration Firestopping and Section 07 92 00, Joint Sealants, as required for the Work of this Contract.
e. Division 23 – HVAC, all Sections

1.14 ADDITIONAL SCOPING

A. Definition of Extent of Prime Contract Work; Additional Prime Contract Work not previously described

1. All Prime Contractors are responsible for reviewing plans and specs as it pertains to their scope of work mentioned in the contract documents. Scopes of work referenced may be found in multiple locations throughout the plans and specifications.
2. Local custom and trade union jurisdictional settlements do not control the scope of work included in each prime contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, the affected prime contracts shall promptly negotiate a reasonable settlement to avoid or minimize the pending interruption and delays.
3. All OSHA safety and hazardous materials regulations will be enforced on this project. All Contractors must submit a safety program, a hazardous materials program, (all required data must be maintained at the job site) and attend safety meetings. Toolbox talks will be required from each prime contractor.
4. All Contractors are responsible for any debris caused by their work. A daily clean-up and disposal is required by each Contractor for the periods which that Contractor is performing work on site, on a day selected by the Construction Manager. Each trade will assign at least one person to the weekly clean-up; the name of this person is to be submitted to the Construction Manager. Any Contractor not providing personnel will be “back-charged” for labor provided by the Construction Manager.
5. All Contractors are responsible for cutting/patching required to complete their work. All exposed finishes must be ready to receive paint, etc.; all concealed openings (piping, ductwork, conduit, etc.) must be repaired to comply with specified wall or deck conditions.

6. Multiple Crews: To maintain the project schedule, each Prime Contractor is to provide multiple crews. Each crew is to be furnished with its own supervision, cranes, scaffold and other means necessary to maintain the Project Schedule.
7. Supervision: The proposed project manger and field superintendent for the project is to have at least five years experience in the proposed position. Each successful bidder shall submit resumes to the Construction Manager for the proposed project manager and field superintendent for the project. This information will be reviewed with the Owner, Architect and Construction Manager for approval. Should the Project Managers and/or Superintendent prove unqualified for the position at any point in the project, the Construction Manager shall issue a letter stating that the person is to be removed from involvement in the project. Action by the contractor must be made within seven working days of receipt of such letter.
8. When selective demolition or cutting and patching (all demolition necessary for work of their contract, including layout, sleeves, coring, debris removal, sawcuts, drywall work, plaster work, grouting, painting, ceiling removal, etc) is required solely by another prime contract to perform their work it shall be by the Prime Contractor requiring the work to achieve the result indicated.
9. Each prime contractor shall return areas disturbed by their work activities to condition prior to start of work.
10. Each prime contractor shall maintain within its field office a complete and current set of Contract Documents (including any Addenda, Change Orders, and Modifications thereto), approved shop drawings, samples, color schedules and other data pertinent to the Project.
11. Each prime contractor is to survey existing work and submit to the Construction Manager a list of damaged areas (i.e. plaster walls, woodwork) prior to commencing work. Any damaged areas not identified prior to the work shall be the responsibility of the contractor/ Contractors working in that area. Construction Manager will have photos of existing conditions on file for reference.
12. The General Construction Work Contract and Site Construction Work Contract is required to submit a construction and submittal schedule based on the milestone dates to the Construction Manager for review and comment no later than 2 weeks after a Notice to Proceed for the work is issued.
13. Unless a specific item or material is noted as to remain the Owner's property or to become the Contractor's property (or similar words), any material having salvage or reuse value shall be inspected by the Owner. If the Owner wishes to retain this material, it shall be turned over to him on the site where directed. If the Owner designates the material as scrap, it shall become the Construction Manager’s property and removed from the site. Material having salvage value shall be carefully removed. If the Construction Manager designates the material as scrap, it shall become the contractor’s property and removed from the site. Material having salvage value shall be carefully removed.
14. When the building is occupied and fire alarm and safety system work is in progress, the Electrical Contractor shall continuously maintain the existing building's fire alarm and detection system and exit and emergency lighting system or provisions must be made by the Electrical Contractor to provide equivalent safety. Electrical Contractor must notify the local fire department of any non-operating systems.
15. The Site Construction Work Contract will be responsible for de-watering all excavations pertaining to their scope of work for the duration that the excavations remain open.
16. All personnel required to be on site shall at all times have all required personnel protective equipment on at all times.
17. All personnel on site shall at all times have a photo ID displayed where visible. Those without will be removed from site at once. If the same individual fails to have the ID a second time they will be removed from site and not be allowed back on site.

1.15 TESTING

A. Required testing and test procedures are indicated under each Division of the Technical Specifications. Other testing shall be performed per generally accepted standards.

B. The Architect shall reserve the right to require additional information as is deemed necessary to fully evaluate testing results.

C. The Owner shall employ and pay for an independent testing and inspection agency for testing requirements of their work as assigned by this scope of work. All testing shall be per technical specification requirements The Prime Contractor requiring testing will notify the Construction Manager twenty-four hours in advance of the required testing to allow for coordination and scheduling. Failure to give sufficient notice will require the prime contractor to pay for alternate testing to satisfy the specification.

1.16 WORK SEQUENCE

A. The Work will be conducted to provide the least possible interference to the activities of the Owner's personnel.

B. All contract scopes of work in unoccupied areas of work can be performed weekdays from 7:00 AM to 3:30 PM unless otherwise noted. Please see schedule for scheduled second shift work. Work cannot be performed in occupied areas. Work shall be scheduled off-hours, vacations and weekends for occupied areas. A Construction Manager Superintendent must be on site at all times that work is being performed. If a contractor fails to maintain the progress as indicated by the milestone schedule by no other fault but its own, and requires overtime to complete the work; the contractor shall make arrangements with the Construction Manager 24 hours in advance and pay for a Construction Manager's superintendent at $125.00 per hour. In the event that the cause for delay is multi-contract, then the costs shall be distributed evenly among contracts. Advise the Construction Manager 48 hours prior to commencing work inside the building.

C. Coordination of any utility and/or power interruption must be done with the Construction Manager. Shutdowns must occur during off-hours and on days when the building is not occupied by the owner.

D. Construction access to the site shall be limited to those designated for contractor's personnel, equipment and deliveries by the Owner. Contractors' staging, parking and storage shall be coordinated by the Construction Manager.

E. Each Contractor shall inspect the site and review the AHERA report on file for the presence of asbestos. Unless otherwise noted, there will be asbestos containing material in place that will require work to take place in the vicinity of, around and/or next to. Each prime contractor that will be working above ceilings, demolishing, in crawl spaces, boiler rooms and all other areas that may contain asbestos per the AHERA report, shall employ "Allied Trades: certified/licensed tradesman as part of the onsite workforce".

1.17 PROJECT MILESTONE SCHEDULE

A. See the milestone schedule to be distributed via addendum.

B. All Prime Contractors are required to submit a schedule based on the milestone dates to the Construction Manager for review and comment no later than 10 days after a Notice to Proceed for the work is issued.

1.18 ALLOWANCES

A. See Specification Section 01 2100. Allowances are to be included in the base bid.

1.19 ALTERNATES

A. The Contractor shall state where requested on the Bid Form the amount to be added to or deducted from the base bid for the alternates described in Section 01 2300 - Alternates.

END OF SECTION 01 1200

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.
4. Testing and inspecting allowances.

C. Related Requirements:

1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.
2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
3. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight [**,**] and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 UNIT-COST ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight [**,**] and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.9 QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight [**,**] and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.10 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of testing and inspection services not specifically required by the Contract Documents are Contractor responsibilities and are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.11 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 20: Quantity Allowance: General Contractor shall Include raking and repointing 750 SF of Masonry at the Weight Room and Locker room.

B. Allowance No. 30: Quantity Allowance: HVAC Contractor shall Include cleaning of 20 LF of existing ductwork, for each replaced Roof Top Unit

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 012200 "Unit Prices."

C. Allowance No. 40: Quantity Allowance: General Contractor shall Include raking and repointing 500 SF of Masonry at the Fieldhouse. of mass rock removal and replacement with satisfactory soil material, as specified in Section 312000 "Earth Moving."

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 012200 "Unit Prices."

D. Allowance No. 41: Quantity Allowance: General Contractor shall Include 320 SF of roof sheathing replacement at the Fieldhouse.

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 012200 "Unit Prices."

E. Allowance No. 1 Testing and Inspecting Allowance: Site Contractor shall include the sum of $15,000. For Testing and Inspection of their scope.

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

F. Allowance No. 2 Testing and Inspecting Allowance: General Contractor shall include the sum of $20,000. For Testing and Inspection of their scope.

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

G. Allowance No. 3 Testing and Inspecting Allowance: HVAC Contractor shall include the sum of $10,000. For Testing and Inspection of their scope.

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

H. Allowance No. 4 Testing and Inspecting Allowance: Plumbing Contractor shall include the sum of $10,000. For Testing and Inspection of their scope.

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

I. Allowance No. 4 Testing and Inspecting Allowance Electrical Contractor shall include the sum of $10,000. For Testing and Inspection of their scope.

1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.
2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
3. Section 014000 "Quality Requirements" for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Site Contractor shall provide a price for Mass rock excavation and replacement with satisfactory soil material at the Athletic Field.

1. Description: Classified mass rock excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Section 312000 "Earth Moving."
2. Unit of Measurement: 1 Cubic Yard of rock excavated, based on in-place surveys of volume before and after removal.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012100 "Allowances."

B. Unit Price No. 10: General Contractor shall provide a price for Mass rock excavation and replacement with satisfactory soil material at the concession stand.

1. Description: Classified mass rock excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Section 312000 "Earth Moving."
2. Unit of Measurement: 1 Cubic Yard of rock excavated, based on in-place surveys of volume before and after removal.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012100 "Allowances."

C. Unit Price No. 41: General Contractor shall provide a price to add or reduce roof sheathing replacement by 32 square feet at the Fieldhouse.

1. Description: Remove existing roof sheathing and replace with new of the same thickness. in accordance with Section 061600 "Sheathing." not otherwise indicated in the Contract Documents.
2. Unit of Measurement: 32 square feet of concrete removed.

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1 : Rock Removal.Sitework Contract & General Contract.

1. Base Bid: Sitework & General contract to remove soil as required to install athletic field/concession building indicated on Drawing and as specified in Sections. "

2. Alternate: Provide a price per cubic yard to remove rock that is encountered, as indicated on Drawing and as specified in Sections "."

B. Alternate No. 2 : Sitework Contract to provide sod in place of seeding.

1. Base Bid: Site Contract to rake seed and hay all disturbed areas.as indicated on Drawings and as specified in Specification Sections. required to install concession building as indicated on Drawings and as specified in Specification Sections.
2. Alternate: Site Contract to provide a price sod all disturbed areas, as indicated on Drawing and as specified in Sections.

C. Alternate No. 3 : Sitework Contract to provide a 2nd Shot Put station.

1. Base Bid: Site Contract to provide one (1) shot put station as indicated on Drawings and as specified in Specification Sections.
2. Alternate: Site Contract to provide a second (2) shot put station, as indicated on Drawing and as specified in Sections.

D. Alternate No. 4 : Sitework Contract to provide an accent color on the track surface.

1. Base Bid: Site Contract to provide colors on track as indicated on Drawings and as specified in Specification Sections.
2. Alternate: Site Contract to provide an additional accent color on the track, as indicated on Drawing and as specified in Sections.

E. Alternate No. 5 : Sitework Contract to provide an alternate turf infill product.

1. Base Bid: Site Contract to provide turf infill material as indicated on Drawings and as specified in Specification Sections.
2. Alternate: Site Contract to provide an alternate turf infill material, as indicated on Drawing and as specified in Sections.

F. Alternate No. 20 : General Contract to provide and install sport flooring weight room.

1. Base Bid: General Contract to demolish and patch Weight Room floor as indicated on Drawings and as specified in Specification Sections.
2. Alternate: General Contract to provide and install the sports flooring in the Weight room, as indicated on Drawing and as specified in Sections.

G. Alternate No. 21 : General Contract to perform Masonry cleaning at north and east facades of the annex building.

1. Base Bid: General Contract perform masonry repointing/reconstruction as indicated on Drawings and as specified in Specification Sections.
2. Alternate: General Contract to provide masonry cleaning at the north and east facades of the high school annex, as indicated on Drawing and as specified in Sections.

H. Alternate No. 30 : HVAC Contract to remove and replace roof top unit H1..

1. Base Bid: HVAC Contract to perform no work on roof top unit H1..
2. Alternate: HVAC Contract to remove and replace with new H1 roof top unit, as indicated on Drawing and as specified in Sections.

I. Alternate No. 31 : HVAC Contract to remove and replace roof top unit K1..

1. Base Bid: HVAC Contract to perform no work on roof top unit K1..
2. Alternate: HVAC Contract to remove and replace with new K1 roof top unit, as indicated on Drawing and as specified in Sections.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 012100 "Allowances" for products selected under an allowance.
2. Section 012300 "Alternates" for products selected under an alternate.
3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided in Project Manual .
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. Certificates and qualification data, where applicable or requested.
    g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.

h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES .
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after commencement of the Work . Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   d. Substitution request is fully documented and properly submitted.
   e. Requested substitution will not adversely affect Contractor's construction schedule.
   f. Requested substitution has received necessary approvals of authorities having jurisdiction.
   g. Requested substitution is compatible with other portions of the Work.
   h. Requested substitution has been coordinated with other portions of the Work.
   i. Requested substitution provides specified warranty.
   j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

Request for Substitution

This form must be completely filled in with all relevant data by the Subcontractor and submitted to the Project Manager for consideration before any request to change the drawing or specification requirements will be considered.

REFERENCE DATA

Project name: _____ Date of Request: _____

Location: _____ Architect's Job No: _____

Request by (firm): _____

Address: _____

Contact person: _____ Phone: _____ FAX: _____

Subcontract works: _____ Package No: _____

SUBSTITUTION REQUEST DATA

SUBSTITUTION REQUESTED IS FOR:

- ☐ Named product.
- ☐ Product type, material, finish or formulation.
- ☐ Fabrication or installation methods.

Reason for request: _____

PRODUCT / MATERIAL / METHOD FOR WHICH SUBSTITUTION IS REQUESTED IS SHOWN ON THE FOLLOWING DOCUMENTS:

Specification: Section No: _____ Page(s): _____ Clause No(s): _____

Drawings: (List No's of all Drawings affected): _____

COST/BENEFIT ANALYSIS

Describe in detail any alteration to any other part of the Works required by use of the requested substitution:

Total nett cost of any such other required alterations, including overhead and profit: $ _____

Cost of Builder's administration (to be filled in by Builder): $ _____

Cost of Architect's documentation and administration (to be filled in by Project Manager): $ _____

Total cost of such other alterations (to be filled in by Project Manager): $ _____

Total cost savings achieved (from page 2, to be filled in by Project Manager): $ _____

Total cost/benefit to Proprietor (to be filled in by Project Manager): $ _____

Benefits to Proprietor other than financial: _____

ADDITIONAL INFORMATION REQUIRED

COMPLETE THE REVERSE SIDE AS APPLICABLE.

ATTACH THE FOLLOWING INFORMATION:

1 Manufacturer's technical data sheets on proposed products.
2 Manufacturer's standard form of warranty.
3 Letter on manufacturer's letterhead stating that manufacturer will warrant products as specified, if specification

COMPARISON OF OPTIONS

Fill in the following blanks as are applicable to the product, material or method type. As a guide, if the item is mentioned in the Specification as a performance or materials requirement, then information about the proposed substitution is required by the Project Manager to evaluate the proposed substitution. Requests lacking relevant information will be returned without action.

SPECIFIED PRODUCT, MATERIAL OR METHOD	PROPOSED SUBSTITUTION
Description:	Description:
Product Name:	Product Name:
Type:	Type:
Model No:	Model No:
Fire rating (hours):	Fire rating (hours):
Thickness:	Thickness:
Composition:	Composition:
Availability (time):	Availability (time):
Country of manufacture:	Country of manufacture:
Substrate preparation required:	Substrate preparation required:
Length of warranty available (years):	Length of warranty available (years):
Sound transfer coefficient (STC):	Sound transfer coefficient (STC):
Exposure class:	Exposure class:
Resistance to chemicals (list):	Resistance to chemicals (list):
Other specified performance criteria (list):	Other specified performance criteria (list):
UNIT COST OF PRODUCT / MATERIAL (Must be completed):	UNIT COST OF PRODUCT / MATERIAL (Must be completed):
$ _____ What _____	$ _____ What _____
Units required: _____ Total value: $ _____	Units required: _____ Total value: $ _____

BUILDER'S REVIEW

I certify that I have checked the above documentation for the proposed Request for Substitution and warrant it to be substantially complete and accurate:

Signed by: _____

Date: _____

PROJECT MANAGER'S ACTION

☐ Request approved.

☐ Request approved subject to qualifications per attached documentation.

☐ Request denied.

☐ Refer Variation Order No: _____

Approved by: _____

Date: _____

Comments: _____

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 .

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect .

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect .

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701CMa .

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Construction Manager may issue a Construction Change Directive on AIA Document G714CMa . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
3. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
4. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect through Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and Construction Manager and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G703 and AIA Document G732 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:
    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment .

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Sustainable design action plans, including preliminary project materials cost data.
7. Schedule of unit prices.
8. Submittal schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
13. Initial progress report.
14. Report of preconstruction conference.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
2. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
3. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
5. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. RFI: Request for Information. Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination of Multiple Contracts: Each contractor shall cooperate with Project coordinator, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors and direction of Project coordinator to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    f. Indicate required installation sequences.
    g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
    a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:
    a. DWG , Version , operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in Autocad 2020. .
    c. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Agreement form acceptable to Owner and Architect.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Owner name.
3. Owner's Project number.
4. Name of Architect and Construction Manager.
5. Architect's Project number.
6. Date.
7. Name of Contractor.
8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Form bound in Project Manual .

1. Attachments shall be electronic files in PDF format.

D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or Construction Manager of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly .

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in Autocad 2020 .
4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement .
    a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106 .
5. The following digital data files will be furnished for each appropriate discipline:
    a. Floor plans.
    b. Reflected ceiling plans.

B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Construction Manager will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner , Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
    a. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Phasing.
    d. Critical work sequencing and long lead items.
    e. Designation of key personnel and their duties.
    f. Lines of communications.
    g. Use of web-based Project software.

h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises and existing building.
p. Work restrictions.
q. Working hours.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect , Construction Manager of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Construction Manager will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    a. Preparation of Record Documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Procedures for completing and archiving web-based Project software site data files.
    d. Submittal of written warranties.
    e. Requirements for completing sustainable design documentation.
    f. Requirements for preparing operations and maintenance data.
    g. Requirements for delivery of material samples, attic stock, and spare parts.
    h. Requirements for demonstration and training.
    i. Preparation of Contractor's punch list.
    j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    k. Submittal procedures.
    l. Coordination of separate contracts.
    m. Owner's partial occupancy requirements.
    n. Installation of Owner's furniture, fixtures, and equipment.
    o. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Construction Manager will conduct progress meetings at regular intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner , Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        1) Review schedule for next period.
    b. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Status of sustainable design documentation.
        5) Deliveries.
        6) Off-site fabrication.
        7) Access.
        8) Site use.
        9) Temporary facilities and controls.
        10) Progress cleaning.
        11) Quality and work standards.
        12) Status of correction of deficient items.
        13) Field observations.
        14) Status of RFIs.
        15) Status of Proposal Requests.
        16) Pending changes.
        17) Status of Change Orders.
        18) Pending claims and disputes.

19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Project Coordinator will conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
   b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
   c. Review present and future needs of each contractor present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site use.
      8) Temporary facilities and controls.
      9) Work hours.
      10) Hazards and risks.
      11) Progress cleaning.
      12) Quality and work standards.
      13) Status of RFIs.
      14) Proposal Requests.
      15) Change Orders.
      16) Pending changes.
2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

Michael Shilale, AIA, LEED
John Cirilli, AIA

REQUEST FOR INFORMATION

MICHAEL SHILALE ARCHITECTS, LLP

140 Park Avenue ☐ New City, New York 10956 ☐ Tel 845-708-9200 ☐ Fax 845-708-9222 ☐ E-mail info@shilale.com

Send all RFI's in writing to Michael Shilale Architects, LLP at the above address/fax number. **Only this form will be accepted, and no questions will be entertained via telephone. By submitting this Request for Information, the Contractor is stating that they have performed a thorough review of the drawings and specifications and the information requested is not contained in the construction documents.**

Project:	© Michael Shilale Architects, LLP	**RFI No.**
MSA File No.:		
NYSED No.:		
Contractor:		
Contract for:	Hazardous Materials Abatement ☐ Demolition ☐ Site Construction ☐ General Construction ☐ Plumbing ☐ Mechanical ☐ Electrical ☐ Other ☐	

Specification Reference:	**Drawing Reference:**

Description, complete with backup information as needed to fully convey the issue:	☐ **Sketch/Information Attached**
Contractor's Proposed Solution:	☐ **Sketch/Information Attached**

Impact on Cost:	**Impact on Schedule:**

Trades/Specialty Contractors Affected:
Trades/Specialty Contractors Coordinated With:

Submitted By:	**Requested Date of Response:**

Architect/Engineer's Response:	☐ **ID No._____** ☐ **Attached** ☐ **Sketch/Information Attached**

By:_____ **Date:**_____

Document2

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for preparing a combined Contractor's Construction Schedule.
2. Section 014000 "Quality Requirements" for schedule of tests and inspections.
3. Section 012900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.

B. Startup construction schedule.

1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at weekly intervals.

F. Material Location Reports: Submit at weekly intervals.

G. Unusual Event Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion .

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
   a. Securing of approvals and permits required for performance of the Work.
   b. Temporary facilities.
   c. Construction of mock-ups, prototypes and samples.
   d. Owner interfaces and furnishing of items.
   e. Interfaces with Separate Contracts.
   f. Regulatory agency approvals.
   g. Punch list.
3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work under More Than One Contract: Include a separate activity for each contract.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.

d. Partial occupancy before Substantial Completion.
e. Use-of-premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Mockups.
   e. Fabrication.
   f. Sample testing.
   g. Deliveries.
   h. Installation.
   i. Tests and inspections.
   j. Adjusting.
   k. Curing.
   l. Startup and placement into final use and operation.
7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   a. Structural completion.
   b. Permanent space enclosure.
   c. Completion of mechanical installation.
   d. Completion of electrical installation.
   e. Substantial Completion.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion .

1. Temporary enclosure and space conditioning.

F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentage for each activity.

I. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

J. Distribution: Distribute copies of approved schedule to Architect , Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.

1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
8. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's and Construction Manager's final release or approval.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect and Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

a. Architect , through Construction Manager, will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
   a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow [**15**] days for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.
   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.

f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams that show factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
   a. Project name and submittal number.
   b. Generic description of Sample.
   c. Product name and name of manufacturer.
   d. Sample source.
   e. Number and title of applicable Specification Section.
   f. Specification paragraph number and generic name of each item.
3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect , through Construction Manager, will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit 2 sets of Samples. Architect and Construction Manager will retain 1 Sample sets; remainder will be returned.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and 1 paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp . Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect and Construction Manager will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S AND CONSTRUCTION MANAGER'S REVIEW

A. Action Submittals: Architect and Construction Manager will review each submittal, indicate corrections or revisions required.

1. PDF Submittals: Architect and Construction Manager will indicate, via markup on each submittal, the appropriate action .
2. Paper Submittals: Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action .

B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect and Construction Manager will discard submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:

1. Section 012100 "Allowances" for testing and inspection allowances.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.

1. Mockups are used for one or more of the following:
   a. Verify selections made under Sample submittals.
   b. Demonstrate aesthetic effects.
   c. Demonstrate the qualities of products and workmanship.
   d. Demonstrate successful installation of interfaces between components and systems.

e. Perform preconstruction testing to determine system performance.

2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.

3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect or Construction Manager.

1.4 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Mockup Shop Drawings:

1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports and documents as specified.

E. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award , and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent .

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.

1. Requirements of authorities having jurisdiction supersede requirements for specialists.

F. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:

1. Provide test specimens representative of proposed products and construction.
2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
4. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
5. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect , through Construction Manager, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager.
3. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's and Construction Manager's approval of mockups before starting corresponding Work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.

8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

1.11 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances specified in Section 012100 "Allowances," as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor , and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.
   a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect , Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect , Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.

1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner , as indicated in the Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect , Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect , through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) *Note: The code listings below are not to be considered all inclusive.*

BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, **and;** Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.

School District	Project Tiltle
North Rockland Central School District	North Rockland High School Projects - Phase 1 - High School
Building	
North Rockland High School	
SED Project #	Project Address
500201-06-0016-035	106 Hammond Road, Thiells, NY 10984
Architect/Engineer:	
Sign and Stamp:	

A/E Firm (or Dba):	Phone	Date
John Cirilli, AIA, LEED	845.708.9200	10/28/2022
Comments:		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A. Steel Construction				**Ch. 22**		
1. Material verification of high-strength bolts, nuts and washers.		X	AISC 360	1705.2 2204	☐	
2. Inspection of high-strength bolting.	X	X	AISC 360 ACI 318	1705.2 2204.2	☑	
3. Material verification of **Structural Steel**. **Open Web Steel Joist and Girders.** Basic protection of steel members, **Seismic Resistance**			AISC 360 ASTM A6, A514, A29 SJ100, 200 AICS 341	1705.2 2203, 2205 1705.2 2207	☐ ☐ ☐	
4. Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	☐	
5. **Cold Formed Steel Construction**- load bearing. **Seismic Resistance**			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	☑ ☐	
6. Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	☐	
7. Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	☐	
a. Structural steel	X	X	AWS D1.1, D1.3	1705.2	☐	
b. Reinforcing steel	X	X	AWS D1.1, D1.3	1705.3.1	☐	
c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	☐	
8. Inspection of steel frame joint details.		X		1705.2	☑	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B.	**Concrete Construction**				**Ch. 19**		
1.	Inspection of reinforcing steel, including prestressing tendons, and verify placement.		X	Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	☐	
2.	Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	☐	
3.	Inspection of anchors to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2, 17.8.2.4	T 1705.3	☐	
4.	Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	☐	
5.	Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	☐	
6.	Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T 1705.3	☐	
7.	Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 26.5	T 1705.3 1908 1909	☐	
8.	Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3	☐	
9.	Erection of precast concrete members.		X	ACI 318: 26.9	T 1705.3	☐	
10.	Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T 1705.3	☐	
11	Inspection of formwork		X	ACI 318: 26.11.1.2 (b)	T 1705.3	☐	

C.	**Masonry Construction**							**Ch. 21**
	INSPECTION AND TESTING **Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17** **All reports to be submitted to the owners representative for use, approval and record.**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**		**BCNYS REFERENCE**	**CHECK IF REQUIRED**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
	L1 = Level 1 Inspection required for nonessential facilities. **L2 =** Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1.	Verify to ensure compliance:							
	a. Proportions of site prepared mortar and grout.		**X L1 & L2**			1705.4 2103.2	☐	
	b. Placement of masonry units and construction of mortar joints.		**X L1 & L2**			1705.4 T 1705.3	☐	
	c. Location and placement of reinforcement, connectors, tendons, anchorages.		**X L1 & L2**			1705.45 2103.4 T 1705.3	☐	
	d. Prestressing technique.		**X L1**			1705.4	☐	
	Grout space prior to grouting.	**X L2**				1705.4	☐	
	e. Grade and size of prestressing tendons and anchorages.		**X L1**			1705.4	☐	
	Placement of grout.	**X L2**				1705.4	☐	
	f. Grout specs prior to grouting.	**X L2**				1705.4	☐	
2.	Inspection program shall verify:							
	a. Size and location of structural elements.		**X L1 & L2**			1704.5 1705.4	☐	
	b. Type, size, and location of anchors.	**X L2**	**X L1**			1705.4 T 1705.3	☐	
	c. Specified size, grade, and type of reinforcement.		**X L1 & L2**			1704.5	☐	
	d. Welding of reinforcing bars.	**X L1 & L2**				1704.5	☐	
	e. Cold/hot weather protection of masonry construction.		**X L1 & L2**			1704.5, 2104.3, 2104.4	☐	
	f. Prestressing force measurement and application.	**X L2**	**X L1**			1704.5	☐	
3.	Verification accessory placement prior to grouting:	**X L2**	**X L1**			1704.5, 2105.2.2, 2105.3	☐	
4.	Grout placement.	**X L1**				1704.5	☐	
5.	Preparation of grout specimens, mortar specimens, and/or prisms.	**X L1 & L2**				1704.5, 2105.2.2, 2105.3	☐	
6.	Compliance with documents and submittals.		**X L1 & L2**			1704.5	☐	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. Wood Construction				**Ch. 23**		
1. Fabrication process of prefabricated **Wood Structural Elements** and assemblies.		X	Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	☐	
2. High-load diaphrams **Seismic Resistance**		X		1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	☐	
E. Soils				**Ch. 18**		
1. Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing		X	ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	☐	
2. **Flood & Stormwater Hazards** [per BCNYS 106]		X	Local Highway Authority Flood Plain Admin. Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	☐ ☐	
F. Specialized Foundations- Piers, Piles				**Ch. 16**		
1. Deep Foundation Elements: Driven Piles Cast in Place Helical Piles		X		T 1705.7 T 1705.8 1705.7 1705.8 1705.9	☐	
G. Exterior Wall Coverings				**Ch. 14**		
1. Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	☐	
H. Misc.						
1. Access Floors and Storage Racks Other Architectural, MEP Components **Seismic Resitance**		X		1705.12	☐	
2. In-Situ Testing		X		1604.6, 1708	☐	
3. Pre-Construction Load Testing		X		1604.7, 1709	☐	
4. Fire Resistant Penitrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UL 263	1705.17 1705.18	☐	
5. **Pre-Submission:** **Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater** [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	**FCNYS 701.6** **BCNYS 703.7** **19CRR-NY XXXII**	☐	
6. **Pre-Submission:** **Hazardous Material Survey** **Water Quality Survey**	X X		verification required ACM Letter- Certificate C. of E. 155 Regulations.	US-EPA NYS-DOH	☐	
7. Other:					☐	

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
T. A/E INSPECTIONS						
1 Foundation Inspections						
a. Footings					☐	
b. Foundation Walls					☐	
c. Slabs On grade					☐	
2 Structural Elements Inspections						
a. Super Structure					☑	
b. Interior Partition					☑	
3 Electrical Inspections						
a. Rough-In					☑	
b. Final					☑	
4 HVAC System Inspections						
a. Fuel burning heating appliances					☐	
b. Chimneys, flues and gas vents					☐	
c. Unit Ventilation/ Ventilation Systems/Air Conditioning Systems					☑	
5 Plumbing Systems Inspections						
a. Below-Grade Plumbing					☑	
b. Rough Plumbing					☐	
c. Finish Plumbing					☐	
6 Fire Protection & Detection Inspections						
a. Sprinkler System						
(i.) Rough-In					☐	
(ii.) Final					☐	
b. Alarm System						
(i.) Rough-In					☑	
(ii.) Final					☑	
7 Exiting Features Inspection						
a. Rough-In					☑	
b. Final					☑	
8 Energy Code Compliance					☑	
9 Elevator Inspection			ASME A17.1		☐	
10 Final Inspection					☑	

NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) *Note: The code listings below are not to be considered all inclusive.*

BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, **and;** Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.

School District	Project Tiltle
North Rockland Central School District	North Rockland High School Projects - Phase 1 - Press Box (Demo)
Building	
Press Box (Demo)	
SED Project #	Project Address
500201-06-7026-001	106 Hammond Road, Thiells, NY 10984
Architect/Engineer:	
Sign and Stamp:	

A/E Firm (or Dba):	Phone	Date
John Cirilli, AIA, LEED - Partner	845.708.9200	10/28/2022
Comments:		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A.	**Steel Construction**				**Ch. 22**		
1.	Material verification of high-strength bolts, nuts and washers.		X	AISC 360	1705.2 2204	☐	
2.	Inspection of high-strength bolting.	X	X	AISC 360 ACI 318	1705.2 2204.2	☐	
3.	Material verification of **Structural Steel**. **Open Web Steel Joist and Girders.** Basic protection of steel members, **Seismic Resistance**			AISC 360 ASTM A6, A514, A29 SJ100, 200 AICS 341	1705.2 2203, 2205 1705.2 2207	☐ ☐ ☐	
4.	Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	☐	
5.	**Cold Formed Steel Construction**- load bearing. **Seismic Resistance**			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	☐ ☐	
6.	Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	☐	
7.	Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	☐	
	a. Structural steel	X	X	AWS D1.1, D1.3	1705.2	☐	
	b. Reinforcing steel	X	X	AWS D1.1, D1.3	1705.3.1	☐	
	c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	☐	
8.	Inspection of steel frame joint details.		X		1705.2	☐	

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B. Concrete Construction				**Ch. 19**		
1. Inspection of reinforcing steel, including prestressing tendons, and verify placement.		X	Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	☐	
2. Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	☐	
3. Inspection of anchors to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2, 17.8.2.4	T 1705.3	☐	
4. Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	☐	
5. Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	☐	
6. Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T 1705.3	☐	
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 26.5	T 1705.3 1908 1909	☐	
8. Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3	☐	
9. Erection of precast concrete members.		X	ACI 318: 26.9	T 1705.3	☐	
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T 1705.3	☐	
11 Inspection of formwork		X	ACI 318: 26.11.1.2 (b)	T 1705.3	☐	

C.	**Masonry Construction**							**Ch. 21**
	INSPECTION AND TESTING **Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17** **All reports to be submitted to the owners representative for use, approval and record.**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**		**BCNYS REFERENCE**	**CHECK IF REQUIRED**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
	L1 = Level 1 Inspection required for nonessential facilities. **L2 =** Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1.	Verify to ensure compliance:							
	a. Proportions of site prepared mortar and grout.		**X L1 & L2**			1705.4 2103.2	☐	
	b. Placement of masonry units and construction of mortar joints.		**X L1 & L2**			1705.4 T 1705.3	☐	
	c. Location and placement of reinforcement, connectors, tendons, anchorages.		**X L1 & L2**			1705.45 2103.4 T 1705.3	☐	
	d. Prestressing technique.		**X L1**			1705.4	☐	
	Grout space prior to grouting.	**X L2**				1705.4	☐	
	e. Grade and size of prestressing tendons and anchorages.		**X L1**			1705.4	☐	
	Placement of grout.	**X L2**				1705.4	☐	
	f. Grout specs prior to grouting.	**X L2**				1705.4	☐	
2.	Inspection program shall verify:							
	a. Size and location of structural elements.		**X L1 & L2**			1704.5 1705.4	☐	
	b. Type, size, and location of anchors.	**X L2**	**X L1**			1705.4 T 1705.3	☐	
	c. Specified size, grade, and type of reinforcement.		**X L1 & L2**			1704.5	☐	
	d. Welding of reinforcing bars.	**X L1 & L2**				1704.5	☐	
	e. Cold/hot weather protection of masonry construction.		**X L1 & L2**			1704.5, 2104.3, 2104.4	☐	
	f. Prestressing force measurement and application.	**X L2**	**X L1**			1704.5	☐	
3.	Verification accessory placement prior to grouting:	**X L2**	**X L1**			1704.5, 2105.2.2, 2105.3	☐	
4.	Grout placement.	**X L1**				1704.5	☐	
5.	Preparation of grout specimens, mortar specimens, and/or prisms.	**X L1 & L2**				1704.5, 2105.2.2, 2105.3	☐	
6.	Compliance with documents and submittals.		**X L1 & L2**			1704.5	☐	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. Wood Construction				**Ch. 23**		
1. Fabrication process of prefabricated **Wood Structural Elements** and assemblies.		X	Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	☐	
2. High-load diaphrams **Seismic Resistance**		X		1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	☐	
E. Soils				**Ch. 18**		
1. Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing		X	ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	☑	
2. **Flood & Stormwater Hazards** [per BCNYS 106]		X	Local Highway Authority Flood Plain Admin. Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	☐ ☐	
F. Specialized Foundations- Piers, Piles				**Ch. 16**		
1. Deep Foundation Elements: Driven Piles Cast in Place Helical Piles		X		T 1705.7 T 1705.8 1705.7 1705.8 1705.9	☐	
G. Exterior Wall Coverings				**Ch. 14**		
1. Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	☐	
H. Misc.						
1. Access Floors and Storage Racks Other Architectural, MEP Components **Seismic Resitance**		X		1705.12	☐	
2. In-Situ Testing		X		1604.6, 1708	☐	
3. Pre-Construction Load Testing		X		1604.7, 1709	☐	
4. Fire Resistant Penitrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UL 263	1705.17 1705.18	☐	
5. **Pre-Submission:** **Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater** [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	**FCNYS 701.6** **BCNYS 703.7** **19CRR-NY XXXII**	☐	
6. **Pre-Submission:** **Hazardous Material Survey** **Water Quality Survey**	X X		verification required ACM Letter- Certificate C. of E. 155 Regulations.	US-EPA NYS-DOH	☐	
7. Other:					☐	

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
T. A/E INSPECTIONS						
1 Foundation Inspections						
a. Footings					☐	
b. Foundation Walls					☐	
c. Slabs On grade					☐	
2 Structural Elements Inspections						
a. Super Structure					☐	
b. Interior Partition					☐	
3 Electrical Inspections						
a. Rough-In					☐	
b. Final					☐	
4 HVAC System Inspections						
a. Fuel burning heating appliances					☐	
b. Chimneys, flues and gas vents					☐	
c. Unit Ventilation/ Ventilation Systems/Air Conditioning Systems					☐	
5 Plumbing Systems Inspections						
a. Below-Grade Plumbing					☐	
b. Rough Plumbing					☐	
c. Finish Plumbing					☐	
6 Fire Protection & Detection Inspections						
a. Sprinkler System						
(i.) Rough-In					☐	
(ii.) Final					☐	
b. Alarm System						
(i.) Rough-In					☐	
(ii.) Final					☐	
7 Exiting Features Inspection						
a. Rough-In					☐	
b. Final					☐	
8 Energy Code Compliance					☐	
9 Elevator Inspection			ASME A17.1		☐	
10 Final Inspection					☑	

NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) *Note: The code listings below are not to be considered all inclusive.*

BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, **and;** Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.

School District	Project Tiltle
North Rockland Central School District	North Rockland High School Projects - Phase 1 - Concessions/Press Box
Building	
Press Box/Concession Stand	
SED Project #	Project Address
500201-06-7079-000	106 Hammond Road, Thiells, NY 10984
Architect/Engineer:	
Sign and Stamp:	

A/E Firm (or Dba):	Phone	Date
John Cirilli, AIA, LEED	845.708.9200	10/28/2022
Comments:		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A.	**Steel Construction**				**Ch. 22**		
1.	Material verification of high-strength bolts, nuts and washers.		X	AISC 360	1705.2 2204	☐	
2.	Inspection of high-strength bolting.	X	X	AISC 360 ACI 318	1705.2 2204.2	☐	
3.	Material verification of **Structural Steel**. **Open Web Steel Joist and Girders.** Basic protection of steel members, **Seismic Resistance**			AISC 360 ASTM A6, A514, A29 SJ100, 200 AICS 341	1705.2 2203, 2205 1705.2 2207	☐ ☐ ☐	
4.	Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	☐	
5.	**Cold Formed Steel Construction**- load bearing. **Seismic Resistance**			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	☑ ☑	
6.	Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	☐	
7.	Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	☐	
	a. Structural steel	X	X	AWS D1.1, D1.3	1705.2	☐	
	b. Reinforcing steel	X	X	AWS D1.1, D1.3	1705.3.1	☐	
	c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	☐	
8.	Inspection of steel frame joint details.		X		1705.2	☐	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B. Concrete Construction				**Ch. 19**		
1. Inspection of reinforcing steel, including prestressing tendons, and verify placement.		X	Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	☑	
2. Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	☐	
3. Inspection of anchors to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2, 17.8.2.4	T 1705.3	☐	
4. Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	☑	
5. Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	☐	
6. Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T 1705.3	☐	
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 26.5	T 1705.3 1908 1909	☐	
8. Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3	☐	
9. Erection of precast concrete members.		X	ACI 318: 26.9	T 1705.3	☐	
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T 1705.3	☑	
11 Inspection of formwork		X	ACI 318: 26.11.1.2 (b)	T 1705.3	☑	

C.	**Masonry Construction**							**Ch. 21**
	INSPECTION AND TESTING **Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17** **All reports to be submitted to the owners representative for use, approval and record.**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**		**BCNYS REFERENCE**	**CHECK IF REQUIRED**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
	L1 = Level 1 Inspection required for nonessential facilities. **L2 =** Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1.	Verify to ensure compliance:							
	a. Proportions of site prepared mortar and grout.		**X L1 & L2**			1705.4 2103.2	☐	
	b. Placement of masonry units and construction of mortar joints.		**X L1 & L2**			1705.4 T 1705.3	☑	
	c. Location and placement of reinforcement, connectors, tendons, anchorages.		**X L1 & L2**			1705.45 2103.4 T 1705.3	☑	
	d. Prestressing technique.		**X L1**			1705.4	☐	
	Grout space prior to grouting.	**X L2**				1705.4	☐	
	e. Grade and size of prestressing tendons and anchorages.		**X L1**			1705.4	☐	
	Placement of grout.	**X L2**				1705.4	☐	
	f. Grout specs prior to grouting.	**X L2**				1705.4	☑	
2.	Inspection program shall verify:							
	a. Size and location of structural elements.		**X L1 & L2**			1704.5 1705.4	☑	
	b. Type, size, and location of anchors.	**X L2**	**X L1**			1705.4 T 1705.3	☐	
	c. Specified size, grade, and type of reinforcement.		**X L1 & L2**			1704.5	☑	
	d. Welding of reinforcing bars.	**X L1 & L2**				1704.5	☐	
	e. Cold/hot weather protection of masonry construction.		**X L1 & L2**			1704.5, 2104.3, 2104.4	☐	
	f. Prestressing force measurement and application.	**X L2**	**X L1**			1704.5	☐	
3.	Verification accessory placement prior to grouting:	**X L2**	**X L1**			1704.5, 2105.2.2, 2105.3	☐	
4.	Grout placement.	**X L1**				1704.5	☐	
5.	Preparation of grout specimens, mortar specimens, and/or prisms.	**X L1 & L2**				1704.5, 2105.2.2, 2105.3	☐	
6.	Compliance with documents and submittals.		**X L1 & L2**			1704.5	☐	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. Wood Construction				**Ch. 23**		
1. Fabrication process of prefabricated **Wood Structural Elements** and assemblies.		X	Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	☐	
2. High-load diaphrams **Seismic Resistance**		X		1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	☐	
E. Soils				**Ch. 18**		
1. Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing		X	ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	☑	
2. **Flood & Stormwater Hazards** [per BCNYS 106]		X	Local Highway Authority Flood Plain Admin. Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	☐ ☐	
F. Specialized Foundations- Piers, Piles				**Ch. 16**		
1. Deep Foundation Elements: Driven Piles Cast in Place Helical Piles		X		T 1705.7 T 1705.8 1705.7 1705.8 1705.9	☐	
G. Exterior Wall Coverings				**Ch. 14**		
1. Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	☐	
H. Misc.						
1. Access Floors and Storage Racks Other Architectural, MEP Components **Seismic Resitance**		X		1705.12	☐	
2. In-Situ Testing		X		1604.6, 1708	☐	
3. Pre-Construction Load Testing		X		1604.7, 1709	☐	
4. Fire Resistant Penitrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UL 263	1705.17 1705.18	☐	
5. **Pre-Submission:** **Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater** [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	**FCNYS 701.6** **BCNYS 703.7** **19CRR-NY XXXII**	☐	
6. **Pre-Submission:** **Hazardous Material Survey** **Water Quality Survey**	X X		verification required ACM Letter- Certificate C. of E. 155 Regulations.	US-EPA NYS-DOH	☐	
7. Other:					☐	

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
T. A/E INSPECTIONS						
1 Foundation Inspections						
a. Footings					☑	
b. Foundation Walls					☑	
c. Slabs On grade					☑	
2 Structural Elements Inspections						
a. Super Structure					☑	
b. Interior Partition					☑	
3 Electrical Inspections						
a. Rough-In					☑	
b. Final					☑	
4 HVAC System Inspections						
a. Fuel burning heating appliances					☐	
b. Chimneys, flues and gas vents					☐	
c. Unit Ventilation/ Ventilation Systems/Air Conditioning Systems					☑	
5 Plumbing Systems Inspections						
a. Below-Grade Plumbing					☑	
b. Rough Plumbing					☑	
c. Finish Plumbing					☑	
6 Fire Protection & Detection Inspections						
a. Sprinkler System						
(i.) Rough-In					☐	
(ii.) Final					☐	
b. Alarm System						
(i.) Rough-In					☑	
(ii.) Final					☑	
7 Exiting Features Inspection						
a. Rough-In					☑	
b. Final					☑	
8 Energy Code Compliance					☑	
9 Elevator Inspection			ASME A17.1		☐	
10 Final Inspection					☑	

NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) *Note: The code listings below are not to be considered all inclusive.*

BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, **and;** Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.

School District	Project Tiltle
North Rockland Central School District	North Rockland High School Projects - Phase 1 - Fieldhouse
Building	
Fieldhouse	
SED Project #	Project Address
500201-06-7008-001	106 Hammond Road, Thiells, NY 10984
Architect/Engineer:	
Sign and Stamp:	

A/E Firm (or Dba):	Phone	Date
John Cirilli, AIA, LEED	845.708.9200	10/28/2022
Comments:		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A.	**Steel Construction**				**Ch. 22**		
1.	Material verification of high-strength bolts, nuts and washers.		X	AISC 360	1705.2 2204	☐	
2.	Inspection of high-strength bolting.	X	X	AISC 360 ACI 318	1705.2 2204.2	☐	
3.	Material verification of **Structural Steel**. **Open Web Steel Joist and Girders.** Basic protection of steel members, **Seismic Resistance**			AISC 360 ASTM A6, A514, A29 SJ100, 200 AICS 341	1705.2 2203, 2205 1705.2 2207	☐ ☐ ☐	
4.	Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	☐	
5.	**Cold Formed Steel Construction**- load bearing. **Seismic Resistance**			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	☐ ☐	
6.	Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	☐	
7.	Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	☐	
	a. Structural steel	X	X	AWS D1.1, D1.3	1705.2	☐	
	b. Reinforcing steel	X	X	AWS D1.1, D1.3	1705.3.1	☐	
	c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	☐	
8.	Inspection of steel frame joint details.		X		1705.2	☐	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B. Concrete Construction				**Ch. 19**		
1. Inspection of reinforcing steel, including prestressing tendons, and verify placement.		X	Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	☐	
2. Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	☐	
3. Inspection of anchors to be installed in concrete prior to and during placement.	X		ACI 318: 17.8.2, 17.8.2.4	T 1705.3	☐	
4. Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	☐	
5. Sampling fresh concrete: slump, air content, temperature, strength test specimens.	X		ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	☐	
6. Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T 1705.3	☐	
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 26.5	T 1705.3 1908 1909	☐	
8. Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3	☐	
9. Erection of precast concrete members.		X	ACI 318: 26.9	T 1705.3	☐	
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T 1705.3	☐	
11 Inspection of formwork		X	ACI 318: 26.11.1.2 (b)	T 1705.3	☐	

C.	**Masonry Construction**							**Ch. 21**
	INSPECTION AND TESTING **Continuous & Periodic is as Defined by the BCNYS-CHAPTER 17** **All reports to be submitted to the owners representative for use, approval and record.**	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**		**BCNYS REFERENCE**	**CHECK IF REQUIRED**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
	L1 = Level 1 Inspection required for nonessential facilities. **L2 =** Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1.	Verify to ensure compliance:							
	a. Proportions of site prepared mortar and grout.		**X L1 & L2**			1705.4 2103.2	☑	
	b. Placement of masonry units and construction of mortar joints.		**X L1 & L2**			1705.4 T 1705.3	☐	
	c. Location and placement of reinforcement, connectors, tendons, anchorages.		**X L1 & L2**			1705.45 2103.4 T 1705.3	☐	
	d. Prestressing technique.		**X L1**			1705.4	☐	
	Grout space prior to grouting.	**X L2**				1705.4	☐	
	e. Grade and size of prestressing tendons and anchorages.		**X L1**			1705.4	☐	
	Placement of grout.	**X L2**				1705.4	☐	
	f. Grout specs prior to grouting.	**X L2**				1705.4	☑	
2.	Inspection program shall verify:							
	a. Size and location of structural elements.		**X L1 & L2**			1704.5 1705.4	☐	
	b. Type, size, and location of anchors.	**X L2**	**X L1**			1705.4 T 1705.3	☐	
	c. Specified size, grade, and type of reinforcement.		**X L1 & L2**			1704.5	☑	
	d. Welding of reinforcing bars.	**X L1 & L2**				1704.5	☐	
	e. Cold/hot weather protection of masonry construction.		**X L1 & L2**			1704.5, 2104.3, 2104.4	☐	
	f. Prestressing force measurement and application.	**X L2**	**X L1**			1704.5	☐	
3.	Verification accessory placement prior to grouting:	**X L2**	**X L1**			1704.5, 2105.2.2, 2105.3	☐	
4.	Grout placement.	**X L1**				1704.5	☑	
5.	Preparation of grout specimens, mortar specimens, and/or prisms.	**X L1 & L2**				1704.5, 2105.2.2, 2105.3	☐	
6.	Compliance with documents and submittals.		**X L1 & L2**			1704.5	☑	

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D. Wood Construction				**Ch. 23**		
1. Fabrication process of prefabricated **Wood Structural Elements** and assemblies.		X	Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	☐	
2. High-load diaphrams **Seismic Resistance**		X		1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	☐	
E. Soils				**Ch. 18**		
1. Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing		X	ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	☐	
2. **Flood & Stormwater Hazards** [per BCNYS 106]		X	Local Highway Authority Flood Plain Admin. Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	☐ ☐	
F. Specialized Foundations- Piers, Piles				**Ch. 16**		
1. Deep Foundation Elements: Driven Piles Cast in Place Helical Piles		X		T 1705.7 T 1705.8 1705.7 1705.8 1705.9	☐	
G. Exterior Wall Coverings				**Ch. 14**		
1. Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	☐	
H. Misc.						
1. Access Floors and Storage Racks Other Architectural, MEP Components **Seismic Resitance**		X		1705.12	☐	
2. In-Situ Testing		X		1604.6, 1708	☐	
3. Pre-Construction Load Testing		X		1604.7, 1709	☐	
4. Fire Resistant Penitrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UL 263	1705.17 1705.18	☐	
5. **Pre-Submission:** **Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater** [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	**FCNYS 701.6** **BCNYS 703.7** **19CRR-NY XXXII**	☐	
6. **Pre-Submission:** **Hazardous Material Survey** **Water Quality Survey**	X X		verification required ACM Letter- Certificate C. of E. 155 Regulations.	US-EPA NYS-DOH	☐	
7. Other:					☐	

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
T. A/E INSPECTIONS						
1 Foundation Inspections						
a. Footings					☐	
b. Foundation Walls					☐	
c. Slabs On grade					☐	
2 Structural Elements Inspections						
a. Super Structure					☑	
b. Interior Partition					☐	
3 Electrical Inspections						
a. Rough-In					☐	
b. Final					☐	
4 HVAC System Inspections						
a. Fuel burning heating appliances					☐	
b. Chimneys, flues and gas vents					☐	
c. Unit Ventilation/ Ventilation Systems/Air Conditioning Systems					☐	
5 Plumbing Systems Inspections						
a. Below-Grade Plumbing					☐	
b. Rough Plumbing					☐	
c. Finish Plumbing					☐	
6 Fire Protection & Detection Inspections						
a. Sprinkler System						
(i.) Rough-In					☐	
(ii.) Final					☐	
b. Alarm System						
(i.) Rough-In					☐	
(ii.) Final					☐	
7 Exiting Features Inspection						
a. Rough-In					☑	
b. Final					☑	
8 Energy Code Compliance					☐	
9 Elevator Inspection			ASME A17.1		☐	
10 Final Inspection					☑	

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms, including "requested," "authorized," "selected," "required," and "permitted," have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms, including "shown," "noted," "scheduled," and "specified," have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 011200 "Multiple Contract Summary" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.
3. Section 012100 "Allowances" for allowance for metered use of temporary utilities.

1.2 USE CHARGES

A. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.

B. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.

C. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

D. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by Owner. Include the following:

1. Methods used to meet the goals and requirements of Owner.
2. Concrete cutting method(s) to be used.
3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with Owner.

1.4 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

B. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices:

1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
2. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 13 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Storage and Staging: Use designated areas of Project site for storage and staging needs.

G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

H. Waste Disposal Facilities:

1. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control:

1. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, in accordance with erosion- and sedimentation-control Drawings .
   a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
   b. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
   c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.

d. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection:

1. Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

F. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations .
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.

3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 012100 "Allowances" for products selected under an allowance.
3. Section 012300 "Alternates" for products selected under an alternate.
4. Section 012500 "Substitution Procedures" for requests for substitutions.
5. Section 014200 "References" for applicable industry standards for products specified.
6. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other

requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Resolution of Compatibility Disputes between Multiple Contractors:
   a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.
3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    a. Submit additional documentation required by Architect through Construction Manager in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
    a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 016400 - OWNER FURNISHED PRODUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Requirements for installing Owner-furnished products, including providing miscellaneous items and accessories for a complete, functioning installation.

1.3 RELATED SECTIONS

A. Section 015800 - Project Identification and Signage: Owner-furnished, Contractor-installed (OFCI) temporary signage.

1.4 PRODUCT HANDLING

A. Protection: Contractor shall use means necessary to protect the materials of this Section before, during, and after installation and to protect completed Work, including products installed by others.

B. Replacements: In the event of damage, Contractor shall immediately repair all damaged and defective Work to satisfaction of Owner's Representative, at no change in Contract Time and Contract Sum.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Products Identified with Contractor Responsibility for Installation:

1. Contractor shall verify mounting and utility requirements for accepted products.

2. Contractor shall provide mounting and utility rough-ins for OFCI products.
   a. Rough-in locations, sizes, capacities and similar type shall be as indicated and required by product manufacturers.
   b. If the Owner substitutes items similar to those scheduled there shall be no change in rough-in cost, unless substitution occurs after rough-in has been completed or rough-in involves other mounting requirements, utilities of different capacity than those required by item originally specified.

3. For items Designated to Be Owner- or Vendor-Furnished: Owner or its vendor will furnish manufacturer's literature or information, shop drawings, or appropriate information for preparing required shop drawings.

B. Installation Instructions: Approved manufacturer's printed descriptions, specifications and recommendations shall govern the Work, unless specifically indicated otherwise.

C. Electrical Components: Contractor shall comply with requirements specified in Division 26 - Electrical, including National Electrical Code (NEC).

D. Plumbing and HVAC Components: Contractor shall comply with requirements specified in Division 22 – Plumbing and Division 23 – HVAC.

2.2 OWNER-FURNISHED/CONTRACTOR-INSTALLED PRODUCT REQUIREMENTS

A. Products Furnished by Owner and Installed by Contractor:

1. Contractor shall coordinate delivery of OFCI products. Owner will furnish products to coincide with construction schedule.

2. Owner will:
   a. Furnish standard integral components of products.
   b. Deliver products to site. Contractor shall assist Owner in offloading products.

3. The Contractor shall:
   a. Receive products at site and give written receipt for product at time of delivery, noting visible defects and omissions; if such declaration is not given, the Contractor shall assume responsibility for such defects and omissions.
   b. Store products until ready for installation and protect from loss and damage.
   c. Uncrate, assemble and set products in place.
   d. Install products in accordance with manufacturer's recommendations, instructions and shop drawings under supervision of manufacturer's representative where specified, supplying labor and material required and making mechanical, plumbing and electrical connections necessary to operate equipment.
   e. Where so specified, installation shall be only by installer approved by manufacturer. If known, approved installer is identified on the Drawings or in the Specifications.
   f. Provide and install backing for all products weighing 20 pounds or more.
   g. Treat all Owner or Vendor supplied products with the same care as all Contractor furnished items.

B. Products Furnished and Installed by Owner:

1. Contractor prepare; vendor install:
   a. General: Contractor shall coordinate deliveries of vendor-supplied products. Vendor will furnish products to coincide with the construction schedule.
   b. Vendor will:
      1) Furnish standard integral components of products.
      2) Deliver products to site.
      3) Make connections to roughed-in utilities.
   c. Contractor shall:
      1) Receive products at site and give written notice of receipt of each product at time of delivery, noting visible defects.

2) Provide rough-in of utility products in accordance with manufacturer's recommendations, instructions and shop drawings under supervision of the manufacturer's representative where specified.
3) Provide and install backing for all products weighing 20 pounds or more.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to commencing Work, Contractor shall verify that Work specified in other Sections has been properly completed and installed as specified to allow for installation of all materials and methods required of this Section.

2. Contractor shall verify that new and existing products and conditions are satisfactory for installation or relocation of OFCI products. If unsatisfactory conditions exist, do not commence the installation until such conditions have been corrected.

B. Discrepancies:

1. In the event of discrepancy, Contractor shall immediately notify the Owner's Representative.

2. Contractor shall not proceed with installation in areas of discrepancy until all such discrepancies have been resolved.

3.2 INSTALLATION

A. Contractor shall relocate and reinstall existing products in accordance with Contract Documents and reviewed shop drawings, original manufacturer's instructions and recommendations if applicable and as directed.

B. Contractor shall install Owner-furnished products in accordance with reviewed shop drawings and manufacturer's printed instructions, as applicable.

3.3 ADJUSTING AND CLEANING

A. Contractor shall adjust products as necessary and as directed by Owner's Representative.

B. Contractor shall clean all new and relocated OFCI products.

C. Contractor shall protect OFCI products from damage until Contract Completion.

3.4 LIST OF OWNER FURNISHED PRODUCTS

a. Athletic Field
- Athletic Field
- Athletic Field Lighting (MUSCO)
- Signage Light Poles

b. Concessions/Press Box
   - Signage on Concession Building
   - Banner Signage on Ramp/Grandstands

c. Weight/Locker Room
   - New Sports floor and column pads
   - Weight Room Equipment
   - Exterior Sign
   - Gym Sound System
   - 24 Linear Feet of New Storage Units in Locker Room

d. RTU'S
   - All RTU's Pre-Purchase

e. Field House - None

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Construction layout.
2. Field engineering.
3. Installation.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 011000 "Summary" for coordination of Owner-furnished products , Owner-performed work , Owner's separate contracts, and limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
5. Section 024116 "Structure Demolition" for demolition and removal of complete building.
6. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site .

1. Prior to submitting cutting and patching plan , review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
   a. Contractor's superintendent.
   b. Trade supervisor responsible for cutting operations.
   c. Trade supervisor(s) responsible for patching of each type of substrate.
   d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Layout Conference: Conduct conference at Project site .

1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
   a. Contractor's superintendent.
   b. Professional surveyor responsible for performing Project surveying and layout.
   c. Professional surveyor responsible for performing site survey serving as basis for Project design.
2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
3. Review requirements for including layouts on Shop Drawings and other submittals.
4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor .

B. Certified Surveys: Submit two copies signed by land surveyor .

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
   a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 CLOSEOUT SUBMITTALS

A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.6 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."

C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Plumbing piping systems.
f. Mechanical systems piping and ducts.
g. Control systems.
h. Communication systems.
i. Fire-detection and -alarm systems.
j. Conveying systems.
k. Electrical wiring systems.
l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Sprayed fire-resistive material.
   e. Equipment supports.
   f. Piping, ductwork, vessels, and equipment.
   g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect through Construction Manager in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.

6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor , that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel and Owner's separate contractors.

1. Provide temporary facilities required for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.
2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.
   a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for coordination of responsibilities for waste management.
2. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
3. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for the Notice of Award.

1.6 INFORMATIONAL SUBMITTALS

A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.

B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

3.3 ATTACHMENTS

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final Completion procedures.
3. List of incomplete items.
4. Submittal of Project warranties.
5. Final cleaning.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Section 017900 "Demonstration and Training" for requirements to train Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number.
    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.
5. Submit testing, adjusting, and balancing records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect and Construction Manager.
   d. Name of Contractor.
   e. Page number.
4. Submit list of incomplete items in the following format:
   a. MS Excel Electronic File: Architect , through Construction Manager, will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Architect .

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
   i. Vacuum and mop concrete.
   j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
   k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   l. Remove labels that are not permanent.
   m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
      1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
   p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
   q. Clean strainers.
   r. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 CORRECTION OF THE WORK

A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Systems and equipment operation manuals.
3. Systems and equipment maintenance manuals.
4. Product maintenance manuals.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
2. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
3. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit on digital media acceptable to Architect . Enable reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists,

assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.8 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

I. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

1.9 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for coordinating Project Record Documents covering the Work of multiple contracts.
2. Section 017300 "Execution" for final property survey.
3. Section 017700 "Closeout Procedures" for general closeout procedures.
4. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of Record Drawings as follows:
    a. Initial Submittal:
        1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
        2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    b. Final Submittal:
        1) Submit PDF electronic files of scanned Record Prints and one set(s) of file prints.
        2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files and one paper copies of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.4 RECORD DRAWINGS

A. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file with comment function enabled.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect through Construction Manager for resolution.
4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
    a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect and Construction Manager.
    e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
3. Note related Change Orders , Record Product Data, and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file .

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders , Record Specifications, and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file .

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file .

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and Construction Manager's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor .

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.6 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.
2. Documentation: Review the following items in detail:
    a. Emergency manuals.
    b. Systems and equipment operation manuals.
    c. Systems and equipment maintenance manuals.
    d. Product maintenance manuals.
    e. Project Record Documents.
    f. Identification systems.
    g. Warranties and bonds.
    h. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.
    k. Seasonal and weekend operating instructions.
    l. Required sequences for electric or electronic systems.
    m. Special operating instructions and procedures.
5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.7 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner , through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 019113

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies the Contractor's responsibilities in the commissioning process. Commissioning requires the participation of the Contractor to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. The commissioning process integrates the traditionally separate functions of system documentation, equipment startup, performance testing and training. Commissioning during the construction phase is intended to achieve the following specific objectives in accordance with the Contract Documents:
1. Verify and document that applicable equipment and systems are installed according to the manufacturer's recommendations, contract requirements, and industry standards and that they receive adequate operational checkout by installing contractors.
2. Verify and document proper performance of equipment and systems.
3. Verify and document that O&M documentation is complete.
4. Verify and document that the Facility operating personnel are properly trained.

C. The systems and equipment to be commissioned are listed in this Section. The Contractor's general commissioning requirements and coordination are detailed in this Section. Specific requirements for commissioning of each system or piece of equipment are detailed in the specification Section for the individual systems or pieces of equipment. A detailed description of the overall commissioning process is included in the appendix.

D. The commissioning process does not reduce the responsibility of the Contractor to provide finished and fully functional systems and equipment.

1.02 SYSTEMS TO BE COMMISSIONED

A. The following systems will be commissioned in this project. Specific requirements for the commissioning of each system are included in the related specification Section.
1. HVAC Work Contract:
    a. Air Handling Units
    d. Temperature Control System
    g. HVAC Piping
    i. Ductwork Distribution System
    l. Testing and Balancing

B. Example Commissioning Documents: Example Pre-Functional Checklists and Functional Test Procedures are provided following the specification Sections of equipment and systems that are scheduled to be commissioned. These documents are included to provide the Contractor examples of the type of documentation that will be required as part of the commissioning process. Equipment and system specific Pre-

Functional Checklists and Functional Test procedures will be developed by the Commissioning Authority based on approved submittals, and then will be provided to the Contractors.

1.03 DEFINITIONS

A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.

B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes in accordance with the Contract Documents.

C. Commissioning authority (CA): An independent agent responsible for the direction and coordination of the commissioning activities. The CA responsible to the Owner's Representative.

D. Commissioning Plan: An overall plan that provides the structure, schedule and coordination planning for the commissioning process.

E. Commissioning Team: The members of the commissioning team consist of the Commissioning Authority, the Owner's Representative, the Contractor, the architect and design engineers. The owner and the building or plant operator/engineer also may be members of the commissioning team.

F. Deferred Functional Tests: Functional tests that are performed after substantial completion, due to partial occupancy, seasonal requirements, design or other site conditions that prevent the test from being performed prior to substantial completion.

G. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents.

H. Factory Testing: Testing of equipment on-site or at the factory by factory personnel.

I. Functional Performance Test (FT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The CA develops the functional test procedures in sequential written form. The CA coordinates, oversees and documents the actual testing. The Contractor performs the functional tests. FTs are performed after prefunctional checklists and startup are complete.

J. Phased Commissioning: Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order to minimize the total construction time. Commissioning shall be provided for each phase according to the schedule for that phase. Some repetition and/or remobilization may be required.

K. Prefunctional Checklist (PC): A list of items to inspect and component tests to conduct to verify proper installation of equipment prior to initiating functional testing.

L. Startup: The initial starting or activating of dynamic equipment, including executing prefunctional checklists.

1.04 COORDINATION

A. The CA is hired by the Mechanical Contractor and works for the Owner. The CA directs and coordinates the commissioning activities. All members of the commissioning team shall work together to fulfill their contractual responsibilities and meet the objectives of the Contract Documents.

B. The CA will work with the Contractor according to established protocols to schedule the commissioning activities. The Contractor shall integrate all commissioning activities into the approved progress schedule. All parties will address scheduling problems and make necessary notifications and changes in a timely manner in order to expedite the commissioning process and maintain the approved progress schedule.

1.05 COMMISSIONING PROCESS

A. Commissioning Plan. The commissioning plan provides guidance in the execution of the commissioning process. Following the initial commissioning scoping meeting the CA will update the plan which is then considered the "final" plan, although it may be revised as the project progresses.

B. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur. A more detailed description of the commissioning process can be found in the Appendix.

1. Commissioning during construction begins with a scoping meeting conducted by the CA where the commissioning process is reviewed with the Commissioning Team.
2. Additional meetings will be required throughout construction, scheduled by the Owner's Representative, to plan, scope, coordinate, and schedule future activities and to resolve problems. When possible, commissioning meetings will be scheduled immediately following construction meetings.
3. Equipment documentation is submitted to the CA during the submittal process, including detailed start-up procedures.
4. The CA works with the Contractor to develop startup activity lists and startup documentation. The CA provides prefunctional checklists to be completed by the Contractor during the startup process.
5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels. In each case prefunctional checklists are completed, submitted, and approved before functional testing begins.
6. The Contractor executes and documents the prefunctional checklists, and provides notification to the Owner's Representative and the CA. The Contractor performs startup and initial checkout. The CA documents that the checklists and startup were completed according to the approved plans.
7. The CA develops specific equipment and system functional performance test procedures. The Contractor reviews the procedures and submits suggestions or comments. Procedures are finalized by the CA.
8. The procedures are executed by the Contractor, under the direction of the CA.
9. Items of non-compliance in material, workmanship, or setup are corrected and retested at the Contractor's expense. The Contractor is responsible for providing

all resources, manpower, and materials necessary to rectify deficiencies as per requirements of the approved schedule.

10. The O&M documentation prepared by the Contractor is reviewed for completeness by the CA.
11. Commissioning is completed before Substantial Completion.
12. The CA reviews, pre-approves and coordinates the training provided by the Contractor and verifies that is was completed.
13. Deferred testing is conducted, as specified or required.

1.06 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor's commissioning responsibilities are as follows (all references apply to commissioned systems and equipment only):

1. Construction and Acceptance Phase:
    a. Attend the commissioning scoping meeting and other necessary meetings scheduled by the Owner's Representative to facilitate the commissioning process.
    b. Facilitate the coordination of the commissioning work by the CA, and with the CA ensure that commissioning activities are being scheduled into the approved progress schedule.
    c. Provide detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, factory test reports, and full warranty information, including all responsibilities of the Owner to keep the warranty in force. The installation, start-up and checkout materials that are actually shipped with the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA. The CA may request further documentation necessary for the commissioning process.
    d. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
    e. Ensure that all subcontractors execute their commissioning responsibilities according to the Contract Documents and approved progress schedule.
    f. Assist in the process of writing detailed test procedures by clarifying the operation and control of commissioned equipment.
    g. Review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
    h. Develop a full start-up and testing plan using manufacturer's start-up procedures and the prefunctional checklists from the CA for all commissioned equipment. Submit to the CA for review and approval prior to startup.
    i. During the startup and initial checkout process, execute all portions of the prefunctional checklists for all commissioned systems and equipment. Verify that system installations include all ports, gages, thermometers, access doors, valves, etc., required for specified functional performance testing.
    j. Provide all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment.
    k. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
    l. Address incomplete Work before functional performance testing.

m. Provide skilled technicians to execute startup of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
n. Provide skilled technicians to perform functional performance testing under the direction of the CA for specified equipment. Provide Manufacturer's Representative as required and as specified in the Specification. Assist the CA in interpreting the monitoring data, as necessary.
o. Correct deficiencies (differences between specified and observed performance) as directed by the Owner's Representative.
p. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions. Provide a copy of the O&M manuals and submittals of commissioned equipment to the CA for review and approval.
q. Provide training as specified.
r. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

2. Warranty Period:
a. Execute seasonal or deferred functional performance testing in accordance with the specifications
b. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractor.

B. Specified special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment shall be provided by the Contractor, and turned over to the facility at the completion of the Work.

C. Datalogging equipment and software required to test equipment will be provided by the Contractor, but shall not become the property of the Owner's Representative.

D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.

E. At 1 year after substantial completion, Contractor shall test and check calibration of all installed CO2 sensors. Re-calibrate sensors to ensure target per person ventilation rates are met and maintained.

PART 3 - EXECUTION

3.01 MEETINGS

A. Scoping Meeting. Prior to the commencement of construction, the CA will schedule, plan and conduct a commissioning scoping meeting with the Commissioning Team.

B. Miscellaneous Meetings. Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with the Contractor, appropriate sub-contractors and suppliers, the Owner's Representative, and the Owner's Representative.

3.02 START-UP, PREFUNCTIONAL CHECKLISTS, AND INITIAL CHECKOUT

A. Prefunctional checklists and initial checkout shall ensure that the equipment and systems are hooked up and operational. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of systems or equipment.

B. Start-up and Initial Checkout Plan. The CA shall assist the commissioning team members responsible for startup of any equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer's recommended procedures have been completed.

C. Execution of Prefunctional Checklists and Startup.
1. Four weeks prior to startup, the Contractor shall schedule startup and checkout with the Owner's Representative.
2. The Contractor shall execute startup and provide the CA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.

3.03 FUNCTIONAL PERFORMANCE TESTING

A. Development of Test Procedures. Using the requirements in the specifications, the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. The Contractor shall provide assistance to the CA in developing the procedures. Prior to testing, the CA shall provide a copy of the test procedures to the Contractor who shall review the tests for feasibility, safety, equipment and warranty protection.

B. Functional performance testing shall document that each system is operating in accordance with the Contract Documents. During the testing process, areas of deficient performance shall be identified. Deficiencies shall be corrected by the Contractor and functional testing shall be re-scheduled. The Contractor shall be responsible for all costs associated with re-testing for functional performance.

C. Each system shall be operated through all modes of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

D. Test Methods. Each function and test shall be performed under conditions that simulate actual conditions as closely as possible. The Contractor shall execute the test and shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the

specified conditions. At the completion of the test, the Contractor shall return all building equipment and systems affected by these temporary modifications to their pre-test condition.

3.04 OPERATION AND MAINTENANCE MANUALS

A. Standard O&M Manuals. The specific content and format requirements for the standard O&M manuals are detailed in section 017823.

B. The Contractor shall compile and prepare commissioning documentation for all equipment and systems and include this information in the O&M manuals.

3.05 TRAINING

A. The Contractor shall be responsible for coordinating, scheduling, and documenting that all required training has been completed successfully.

B. The Contractor shall have the following training responsibilities:
   1. Provide a training plan two weeks before the planned training.
   2. Provide comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.
   3. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment.
   4. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
   5. Training shall include:
      a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
      b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, and any emergency procedures.
      c. Discussion of relevant health and safety issues and concerns.
      d. Discussion of warranties and guarantees.
      e. Common troubleshooting problems and solutions.
      f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
      g. Discussion of any peculiarities of equipment installation or operation.

3.06 DEFERRED TESTING

A. Unforeseen Deferred Tests. If any check or test cannot be completed due to project conditions, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Owner's Representative. These tests will be conducted in the same manner as the seasonal tests as soon as possible.

B. Seasonal Testing. Seasonal testing (tests delayed until weather conditions are closer to the system's design conditions) shall be completed as part of this contract. Make any

final adjustments to the O&M manuals and as-builts resulting from information gained during testing.

END OF SECTION

SECTION 020500 - REPORTS ON EXPLORATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including other Division 1 and Technical Specification Sections apply to this Section.

1.02 SUMMARY

A. Section includes reference data collected by the Owner prior to the bidding period as follows:

1. Geotechnical evaluation of the site.

1.03 INVESTIGATIONS

A. Geotechnical investigations titled Geotechnical Evaluation Proposed Athletic Facility Improvements North Rockland High School, dated October 20, 2022 were performed by Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. 1279 Route 300, Newburgh, NY 12550.

B. Bidders are encouraged to examine the data and to make their own visual investigations of the site before bidding.

C. Contractors may perform additional test borings and other exploratory operations at no additional cost to the Owner upon approval of the Construction Manager and Architect.

1.04 REPORTS

A. Any Prime Contractor, both during bidding and after execution of the Contract, are permitted to investigate the nature, character, quality and quantity of above ground and below ground conditions apt to be encountered. Any reliance on data made available by the Owner is at the Contractor's risk.

B. No claim whatsoever shall be made by any Prime Contractor against the Owner or the Project Designer for, or on account of such available data, or neglected of such data to be made available by the Owner or the Project Design team.

1.05 INTERPRETATIONS

A. Geotechnical data is provided with the Bidding Documents only for information and the convenience of Bidders. The Owner, Construction Manager and Architect disclaim any responsibility for the accuracy, true location and extent of the geotechnical investigation that has been prepared by others. They further disclaim responsibility for the interpretation of the data by Bidders, as in projecting subsurface logs and classifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 APPENDIX

A. Geotechnical Evaluation Proposed Athletic Facility Improvements North Rockland High School, dated October 20, 2022 were performed by Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. 1279 Route 300, Newburgh, NY 12550.

END OF SECTION 020500

Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

GEOTECHNICAL EVALUATION
PROPOSED ATHLETIC FACILITY IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

Submitted To:

North Rockland Central School District

106 Hammond Road
Thiells, New York 10984

October 20, 2022

W.O. 11584.01

Submitted By:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.

1279 Route 300, 2nd Floor
Newburgh, NY 12550

(P) 845.567.6656
(F) 845.567.6248

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

North Rockland Central School District
106 Hammond Road
Thiells, New York 10984

Attention: C/O: Mr. Joe Kral Jr., Landscape Architect/Project Manager– The LA Group
Via email: (jkral@thelagroup.com)

October 20, 2022

RE: W.O. 11584.01
GEOTECHNICAL EVALUATION
NORTH ROCKLAND CENTRAL SCHOOL DISTRICT
NORTH ROCKLAND HIGH SCHOOL
PROPOSED ATHLETIC FACILITY IMPROVEMENTS
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

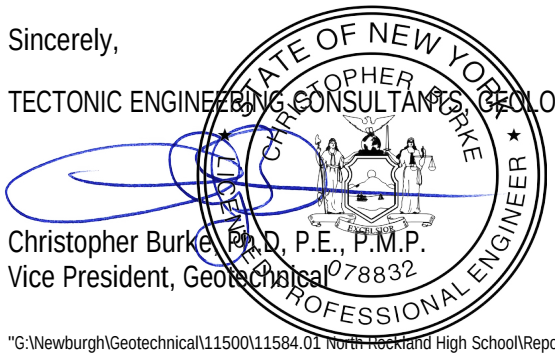
Dear Mr. Kral:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. is pleased to submit this subsurface investigation and geotechnical engineering evaluation for the proposed new building and site improvements to the athletic facility of the North Rockland High School campus, in the Hamlet of Thiells, New York. The purpose of the investigation was to evaluate the subsurface conditions within the areas of proposed site improvements, and to provide geotechnical recommendations for design and construction of the proposed new structures and improvements. This report presents detailed information about the investigations, our findings and recommendations.

We appreciate this opportunity to assist you with this project. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

TECTONIC ENGINEERING CONSULTANTS, GEOLOGISTS & LAND SURVEYORS, D.P.C.



Christopher Burke, Ph.D, P.E., P.M.P.
Vice President, Geotechnical

"G:\Newburgh\Geotechnical\11500\11584.01 North Rockland High School\Report\TEC Cover Letter.docx"

Newburgh Office

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GEOTECHNICAL EVALUATION
PROPOSED ATHLETIC FACILITY IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

TABLE OF CONTENTS

1.0 INTRODUCTION

In accordance with your request and authorization, Tectonic Engineering Consultants, Geologists, and Land Surveyors D.P.C. (Tectonic) has completed a subsurface investigation and geotechnical engineering evaluation for the proposed structures and site improvements within the athletic facility at North Rockland High School. The purpose of the investigation was to evaluate the subsurface conditions within the areas of improvements, and to provide geotechnical recommendations for the design and construction of the proposed structures and site improvements. This report presents detailed information about the investigation, our findings, and recommendations.

2.0 SCOPE OF SERVICES

The geotechnical investigation was performed for North Rockland Central School District (hereafter referred to as the Client), and coordinated through The LA Group, herein referred to as Client Agent. The scope of the geotechnical investigation consisted of the following:

- Review of geological information publicly available through the United States Geological Survey (USGS) and the National Resources Conservation Service (NRCS).
- Drilling, sampling, and logging of test borings and infiltration tests within the areas of the proposed new structures and site improvements. These included:
    - Fifteen (15) structural borings, designated as borings SB-1 through SB-13, SB-7A, and SB-8A, for the proposed new concession building, new bleachers, new athletic field lighting, and new baseball and softball field dugouts.
    - Six (6) pavement borings, designated as borings PB-1 through PB-6, for proposed new asphalt-paved pedestrian walkways and an ADA parking lot.
    - Drilling and performance of twelve (12) infiltration tests, designated as INF-1 through INF-12, for the proposed improvements to the stormwater management of the existing fields.
- Field inspection by a Tectonic representative, working under the supervision of a New York State licensed Professional Engineer, to locate the borings and infiltration tests; and log and classify all soil samples.
- Laboratory testing of soil samples selected to verify the field classifications of the soils, and to evaluate the engineering characteristics of the soil.
- Geotechnical engineering analyses of the subsurface conditions as they relate to the design and construction of the proposed structures, pavement sections, and site improvements.
- Preparation of this report presenting the results of the subsurface investigation, engineering analyses, and our geotechnical recommendations for the design and construction for the geotechnical aspects of the proposed site improvements.

3.0 SITE AND PROJECT DESCRIPTIONS

The project site is located on the campus of North Rockland High School, located at 106 Hammond Road, in the Hamlet of Thiells, Town of Haverstraw, Rockland County, New York. The campus contains an existing three-story high school building within the southwestern portion of the campus, and existing athletic facilities within the northern and eastern portions of campus. There are existing asphalt-paved parking lots adjacent to the north, west, south, and southeast of the existing school building. The improvements are proposed to be constructed within the athletic facility to the east of the school building. The project site is bound by the school building to the west, wooded areas to the north and east, and a line of trees that separates the athletic field from residential structures to the south. As of the writing of this report, the eastern athletic facility contains existing baseball, softball, and soccer fields on the western half of the site, and a multipurpose turf field with a perimeter running track on the eastern half of the site.

Based on a review of a historical topographic survey provided by the USGS, entitled "Ramapo Quadrangle", dated 1891, a branch of Minisceongo Creek previously extended through the center of the high school campus in a north-south alignment. A review of topographic surveys provided by the USGS between 1910 and 1931 indicate that the creek was filled in, and the site was re-graded. Based on a topographic survey provided by the Client Agent, site grades within the existing baseball and softball fields generally slope downwards from east to west, with surface elevations between approximately +277 and +273 feet. Site grades within the existing multipurpose field slope gently from east to west, with surface elevations between +273 and +272 feet. Site grades within the proposed ADA parking lot to the southwest of the multipurpose field gently slope downwards from north to south, with surface elevations between approximately +278 and +276 feet. All elevations referenced herein are per the North American Vertical Datum of 1988 (NAVD88).

The proposed project will reportedly be completed in two phases; the first phase will include new stormwater management systems for the existing multipurpose field, a new concession building with a second-floor press box, new pedestrian walkways, and lighting structures to the west of the track, expanded bleachers to the east of the track, a perimeter pedestrian walkway adjacent to the track, and an ADA parking lot to the southwest of the multipurpose field. Based on architectural drawings provided by the Client Agent, the new concession building is not proposed to have a below-grade basement. The second phase will include improvements to the existing baseball and softball fields, which will include new synthetic turf fields, field lighting, dugouts, bullpens, bleachers, and pedestrian walkways to the west of the field.

Based on architectural plans provided by the Client Agent, the new concession building will reportedly be approximately 1,800 square feet (sf) in area and will be constructed adjacent to the existing bleachers to the west of the multipurpose field. Stairs to the press box will be constructed to the south of the concession building. Due to the preliminary nature of the project, structural loading values were not available, but it is anticipated that the building will be relatively lightly loaded. The proposed baseball and softball field dugouts are proposed to be constructed at existing grade. Based on conversations with the Client Agent, significant re-grading of the site to construct the proposed improvements is not expected; however, no finished floor elevations were provided for any of the proposed structures.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling, sampling, and logging of twenty-one (21) total borings within the eastern athletic facility, designated as borings SB-1 through SB-13, SB-7A, and SB-8A (structural borings), PB-1 through PB-6 (pavement borings); and the drilling and performance of twelve (12) infiltration tests, designated as INF-1 through INF-12. Borings SB-7A and SB-8A were offset from borings SB-7 and SB-8 respectively, due to relatively shallow obstructions encountered during sampling. The test locations were generally performed at the Client Agent requested locations. The boring and infiltration test locations are shown on the attached Boring and Infiltration Test Location Plan, Figure 1.

The borings were drilled by Core Down Drilling, LLC., between August 9 and September 15, 2022, using track-mounted CME 55LC and Geoprobe 7822DT drill rigs, equipped with automatic hammers. The borings were advanced using 3-¼-inch inside-diameter hollow-stem augers. Within the structural borings, Standard Penetration Testing (SPT) was conducted with a split-spoon sampler continuously to depths of up to 12 feet, and then 5-foot maximum intervals thereafter. Within the pavement borings, SPT sampling was performed continuously to a depth of 6 feet. SPT sampling was performed in general accordance with the requirements of ASTM Standard D1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".* SPT N-values were recorded for each soil sample taken. Samples of the soil obtained during the investigation were retained in glass jars, and are currently stored at our material testing laboratory. The boreholes were backfilled with grout to match the existing conditions.

The infiltration tests were performed within 4-inch diameter holes drilled within the existing athletic fields. Infiltration tests INF-1 through INF-5 were advanced within the existing turf multipurpose field; INF-6 was advanced to the south of the multipurpose field; INF-7 and INF-8 were advanced within the existing softball field,

in the northwest corner of the athletic facility; INF-9 through INF-12 were advanced within the existing baseball field, in the southwest corner of the athletic facility. The locations of the infiltration tests are also shown on Figure 1. The infiltration test holes were drilled to depths of approximately 60 inches. Each infiltration test was performed in accordance with the requirements dictated by New York State, including a pre-soak and measurement over four (4) one-hour intervals. Upon completion, the infiltration test holes were backfilled with drill cuttings.

A geotechnical engineer observed the subsurface investigation and prepared logs of the subsurface conditions, under the purview of a Professional Engineer licensed in New York State. All materials encountered were classified in accordance with the Unified Soil Classification System (ASTM D2488), and the Modified Burmister Soil Classification System. Copies of the boring and infiltration test logs are included in Appendix I.

5.0 LABORATORY TESTING

Laboratory testing was performed on soil samples selected to assist in evaluating the engineering properties of the encountered soils and to help in field identifications of the soils. Testing included the performance of twelve (12) grain-size distribution tests, performed in general accordance with ASTM Standard D6913, and one (1) Atterberg limits determination, performed in general accordance with D4318. The results of the laboratory testing are included in Appendix II.

6.0 OVERALL SUBSURFACE CONDITIONS

A review of USGS and New York State geologic maps and surveys indicates that the site is generally underlain by fine sandy loam, and upper layers of fill in the western portion of the existing baseball field and has been previously re-graded. Based on the results of the subsurface investigation, the site is generally underlain by an upper layer of fill and native till soils. The fill soils are likely a mixture of re-worked native soils and imported fill to construct the athletic facility. The following sections provide generalized descriptions of the soils and groundwater conditions encountered in the borings. Detailed descriptions of the subsurface conditions are provided in the boring and infiltration test logs included in Appendix I.

As noted above, an automatic hammer was used in the SPT sampling of the borings. Given that an automatic hammer imparts more energy into the split spoon sampler than a safety hammer (N_{60}) – the standard hammer used for most geotechnical engineering calculations – an energy correction factor of 1.3 is applied to the field N-values to obtain the N_{60}-values.

6.1 Proposed Concession and Press Box Building

Borings SB-1 and SB-2 were advanced within the footprint of the concession and press box building, to the west of the multipurpose field and adjacent to the existing bleachers. Underlying a thin layer of gravel, a layer of fill soils was encountered to a depth of approximately 6 feet below existing ground (bgs). The fill soils generally consisted of brown-gray coarse-to-fine sand and gravel, with varying amounts of fines. Field SPT N-values within the fill ranged from 8 to 35 blows per foot (bpf). When corrected, SPT N_{60}-values ranged from approximately 10 to 46 bpf, corresponding to a medium dense to dense condition. Laboratory results of a soil sample tested indicates that the fill soils within the footprint of the concession and press box building are comprised of between approximately 20 and 46 percent coarse-to-fine gravel, 20 to 42 percent coarse-to-fine sand, and 11 to 20 percent passing the #200 sieve. The fill soils have USGS designations of SM, GW-GM, and GM.

Underlying the fill soils in both borings, native soils were encountered to the termination depths explored. The native soils generally consisted of variable-colored coarse-to-fine sand, with varying amounts of coarse-to-fine gravel and fines. Exceptions occurred in pockets where silt (boring SB-1 from approximately 35 to 42 feet bgs) and gravel (boring SB-2 from approximately 15 to 20 feet bgs) were encountered as the primary material component. Field SPT N-values within the native soils ranged from 1 to 35 bpf. When corrected, SPT N_{60}-values ranged from approximately 1 to 45 bpf, corresponding to a very loose to dense condition. Based on the SPT N_{60}-values, loose layers of native soils were encountered between 15 and 30 feet within boring SB-1, and between 15 and 20 feet within boring SB-2. The native soils within the footprint of the concession and press box building are comprised of between approximately 0 and 61 percent coarse-to-fine gravel, 20 to 45 percent coarse-to-fine sand, and 10 to 45 percent passing the #200 sieve. The native soils have USCS designations of SM, GM, and ML.

As indicated on the boring logs, saturated soil conditions were observed within the native soils in the footprint of the concession and press box building at a depth of approximately 15 feet in borings SB-1 and SB-2. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions and may be encountered in a perched condition overlying the finer-grained soils.

6.2 Proposed Multipurpose Field Improvements

Borings SB-3 through SB-8, SB-7A and SB-8A were advanced in the vicinity of the existing multipurpose field for the proposed new field lighting structures, and new visitors bleacher stands to the east of the multipurpose field. Borings SB-3 and SB-4 were advanced to the west of the multipurpose field and borings SB-5 through SB-8, SB-7A and SB-8A were advanced to the east of the multipurpose field. Boring SB-7 was terminated at auger refusal at a depth of 4 feet bgs. Boring SB-7A was then offset approximately 3 feet north of boring SB-7. Boring SB-8 was terminated at auger refusal at a depth of 8 feet bgs. Boring SB-8A was then offset approximately 7 feet north of SB-8. Borings SB-7 and SB-8 were likely terminated on cobbles or boulders. Underlying a thin veneer of topsoil-like material, fill soils were encountered to approximate depths between 2 and 6 feet bgs. The fill soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. Field SPT N-values within the fill soils ranged from 6 bpf to sampler refusal, which is defined as less than 6 inches of sampler penetration for 50 blows of the hammer. When corrected, SPT N_{60}-values ranged from approximately 8 bpf to sampler refusal, indicating a loose to very dense condition. The fill soils have USCS classifications of SM and GM.

Underlying the fill, native soils were encountered to the termination depths of the borings. It should be noted that borings SB-6, SB-7A, and SB-8A were terminated at auger refusal at depths between approximately 16 and 20.3 feet bgs. The native soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. Layers of silt were encountered between 30 and 32 feet bgs within boring SB-3 and between 10 and 20 feet bgs within boring SB-6. Field SPT N-values within the native soils ranged from 3 bpf to sampler refusal. When corrected, SPT N_{60}-values ranged from approximately 4 bpf to sampler refusal, indicating a very loose to very dense condition. The native soils within the footprint of the proposed lighting structures were generally observed in a medium dense to dense condition; the only loose layers were observed between 30 and 32 feet bgs within boring SB-3, and between 0 and 2 feet bgs within boring SB-6. Laboratory results of soil samples tested indicate that the native soils within the footprints of the proposed lighting structures are comprised of approximately 15 to 55 percent coarse-to-fine gravel, 33 to 49 percent coarse-to-fine sand, and 5 to 36 percent passing the #200 sieve. The native soils have USCS designations of SM, GP-GM, GM, and ML.

Infiltration tests INF-1 through INF-5 were advanced within the existing multipurpose turf field, and infiltration test INF-6 was advanced to the southeast of the multipurpose field for the proposed stormwater management system. SPT sampling was not performed within the infiltration test holes. The results of the infiltration tests are provided on the attached Infiltration Test logs, Appendix I.

As indicated on the boring logs, saturated soil conditions were observed within the native soils in the vicinity of the multipurpose field at a depth of approximately 15 feet within borings SB-3 and SB-4.

6.3 Proposed Baseball/Softball Field Improvements

Borings SB-9 through SB-13 were advanced within the existing baseball and softball fields on the western portion of the athletic facility for the proposed new field lighting, dugouts, and associated baseball field improvements. Underlying a thin veneer of topsoil-like material, the subsurface conditions generally consisted of fill soils, underlain by native sand, silt, and gravel soils.

Fill soils were encountered in all borings to approximate depths between 4 and 6 feet bgs. The fill soils generally consisted of brown coarse-to-fine sand and gravel, with varying amounts of fines. Field SPT N-values within the fill soils ranged from 12 to 58 bpf. When corrected, SPT N_{60}-values ranged from approximately 16 to 75 bpf, indicating a medium dense to very dense condition. The fill soils encountered within the existing baseball and softball fields are comprised of approximately 10 to 50 percent coarse-to-fine gravel, 20 to 50 percent coarse-to-fine sand, and 10 to 35 percent passing the #200 sieve. The fill soils have USCS classifications of SM and GM.

Underlying the fill soils, native soils were encountered to the termination depths of the borings. The native soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. A layer of silt with approximately 40 percent fine sand and 14 percent coarse gravel was observed between approximately 4 and 6 feet within boring SB-10. Field SPT N-values within the native soils ranged from 2 bpf to sampler refusal. When corrected, SPT N_{60}-values ranged from approximately 3 bpf to sampler refusal, indicating a very loose to very dense condition. Loose layers of native soils were observed between 10 to 15 feet, and 20 to 32 feet bgs within boring SB-9, between 4 and 8 feet, and 15 to 20 feet bgs within boring SB-10, and between 6 and 32 feet bgs within boring SB-11. Laboratory results of soil samples tested indicate that the native soils are comprised of approximately

14 to 39 percent coarse-to-fine gravel, 39 to 51 percent coarse-to-fine sand, and 7 to 47 percent passing the #200 sieve. The native soils have USCS classifications of SW-SM, SM, ML, and GM.

Infiltration tests INF-7 through INF-12 were advanced within the existing baseball and softball fields, for the proposed future stormwater management system. SPT sampling was not performed within the infiltration test holes.

As indicated on the boring logs, saturated soil conditions were encountered within borings SB-9 through SB-13 at varying depths. Groundwater was observed at a depth of 8 feet bgs within borings SB-9 and SB-10, and between 10 and 15 feet bgs within borings SB-11 through SB-13.

6.4 Pavement Borings

Borings PB-1 through PB-6 were advanced around the perimeter of the existing baseball field for the proposed pedestrian asphalt paths, and the proposed ADA parking lot to be constructed to the southeast of the baseball field. In general, the subsurface conditions consisted of pockets of fill soils, and native soils to the termination depths of the borings of up to 6 feet bgs.

Underlying a thin veneer of topsoil-like material, gravel, or the running track surface and asphalt, fill soils were observed to depths up to 6 feet bgs within borings PB-1 through PB-5. The fill soils generally consisted of variable-colored coarse-to-fine gravel, with varying amounts of coarse-to-fine sand and fines. Field SPT N-values within the fill soils ranged from 13 to 56 bpf. When corrected, SPT N_{60}-values ranged from approximately 17 to 73 bpf, indicating a medium dense to very dense condition. Laboratory results of soil samples tested indicate that the fill soils are comprised of approximately 21 to 49 percent coarse-to-fine gravel, 37 to 65 percent coarse-to-fine sand, and 12 to 14 percent passing the #200 sieve. The native soils have USCS classifications of GM.

Native soils were encountered below the fill soils within borings PB-2, PB-4, and PB-5, and below a thin veneer of topsoil-like material within boring PB-6. The native soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. SPT N-values within the native soils ranged from 20 to 28 bpf. When corrected, SPT N_{60}-values ranged from 26 to 36 bpf, indicating a medium dense to dense condition. The native soils have USCS classifications of SM and GM.

As indicated on the boring logs, saturated soil conditions were not encountered within any of the pavement borings. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

7.0 INFILTRATION TESTS

Twelve (12) infiltration tests, designated as INF-1 through INF-12 were performed throughout the project site. In general, these tests found that the infiltration rates vary significantly throughout the site. The site soils within infiltration tests INF-1, INF-2, advanced within the northern portion of the multipurpose field, and INF-6, advanced within the landscape area to the southeast of the multipurpose field, had a relatively low infiltration rate, with measured rates between approximately 2 to 2.6 inches per hour (iph). The infiltration rates within the center and southern portion of the multipurpose field, and within the baseball and softball fields had relatively high infiltration rates, with measured rates ranging from approximately 13 to 24 iph. The stable infiltration rates are presented in the infiltration test logs, attached to Appendix I.

8.0 SEISMIC SITE COEFFICIENTS AND LIQUEFACTION POTENTIAL

Based on the results of the subsurface investigation and the criteria outlined in the current edition of the New York State Building Code (Code), the subsurface conditions underlying the site should be considered Class D, with maximum spectral response accelerations at short periods (S_{MS}) equal to 0.452g and at 1-second periods (S_{M1}) equal to 0.146g. Based on the procedures outlined in the Code, the corresponding five-percent damped design spectral response acceleration at short periods, S_{DS}, is equal to 0.301g, and at 1-second, S_{D1}, is equal to 0.098g. It should be noted that the values given above are the same, whether the structures to be built are essential or non-essential facilities.

Liquefaction of soils can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, granular soils saturated by a shallow groundwater table are most susceptible to liquefaction. Liquefaction occurs when an earthquake and associated ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid increase in pore-water pressure, causing the soil to behave as a fluid for short periods.

An analysis was performed to evaluate the liquefaction potential at the site, in accordance with the Code, using a procedure recommended by Youd et. al. (2001). This method estimates the stresses likely to be induced by an earthquake and the stresses likely to initiate liquefaction using the SPT N-values, the effective overburden pressure, and the peak horizontal ground acceleration caused by the design seismic event. The factors of safety against liquefaction were computed by the ratio of cyclic shear strength of the soil to the cyclic shear stress induced by the seismic event. Using a design earthquake magnitude of 5.47 and the peak horizontal ground acceleration of 0.176g, specified by the Code and reported by the USGS, the liquefaction analysis indicates that the subsurface soils have a factor of safety against liquefaction greater than the generally accepted minimum of 1.1. Subsequently, the soils underlying the site are unlikely to liquefy during the design earthquake.

9.0 DISCUSSION AND CONCLUSIONS

The proposed project consists of various site improvements throughout the athletic facility, including the installation of new stormwater management systems within the multipurpose, baseball, and softball fields, a new concession building with a second-floor press box, new bleachers, pedestrian walking paths, field lighting, and an ADA parking lot. Construction of the various site improvements are feasible from a geotechnical standpoint. The results of the subsurface investigation indicate that the site is generally underlain by fill soils, and native till, consisting of sand and gravel, with varying amounts of fines. The fill soils were generally observed in a medium dense to dense condition, and the native soils were generally in a medium dense condition, with isolated pockets of relatively deep loose native soils.

The proposed 1,800 sf concession building with a second-floor press box is proposed to be constructed to the west of the multipurpose field, adjacent to the existing bleachers. As of the writing of this report, structural loading values were not available, but based on the anticipated construction and use of the building, it is anticipated that the structure will impart relatively light loads. Borings SB-1 and SB-2 were advanced within the footprint of the proposed building. Within the borings, medium dense native soils were observed between 0 and 15 feet bgs. Loose native soils were observed between 15 and 30 feet bgs within boring SB-1, and between 15 and 20 feet bgs within boring SB-2. Due to the anticipated light loads of the building, our analysis indicates that the influence of the foundation loads will be minimal at the depth of the loose layers of soil. Therefore, the proposed building can be supported by traditional, shallow foundations. Significant re-grading in the footprint of the building is not anticipated; therefore, the proposed building is assumed to have an FFE of approximately +279 feet.

New field lighting structures are proposed to be constructed adjacent to the multipurpose, baseball, and softball fields. The subsurface conditions in the vicinity of the multipurpose field generally consists of medium dense to dense native sand and gravel soils. It should be noted that loose native soils were observed between 6 and 32 feet bgs within boring SB-11, advanced within the center of the softball field. Specifications regarding the field lighting structures were not available as of the writing of this report; however, based on our experience on similar projects, the preferred foundation for light poles are drilled shaft foundations, which can be designed to resist the large overturning moments typical of these structures.

New visitor bleachers are proposed to be constructed to the east of the multipurpose field. Borings SB-6, SB-7, and SB-7A were advanced within the vicinity of the proposed bleachers. The subsurface conditions generally consisted of loose to very dense native soils. A loose layer of native soil was observed between 0 and 2 feet bgs within boring SB-6. The bleachers are expected to be supported by shallow foundations, so it is anticipated that the loose upper layer will be excavated as part of the construction.

New dugouts are proposed to be constructed for the existing softball field, located in the northwest corner of the athletic facility. Based on the provided survey, there are existing dugouts for the baseball field, in the southwest corner of the facility that are constructed at grade. It is anticipated that the new dugouts will be constructed in the style of the baseball field dugouts. Based on documents provided by the Client Agent, the dugouts are proposed on slabs-on-grade. Based on the subsurface conditions observed, the dugout slabs can be supported either on the in-place fill soils, or on properly compacted structural fill. The footprints of the dugout slabs should be properly prepared and compacted per Section 11 prior to the placement of concrete to minimize potential settlement. Seasonal deformation of slabs bearing above the frost depth can be reduced by undercutting the frost susceptible soil subgrades and replacing them with gravel or other non-frost susceptible soils, as described in Section 11.

It is Tectonic's understanding that a new ADA parking lot will be constructed to the southwest of the multipurpose field, and pedestrian walkway will be constructed around the perimeter of the athletic facility. Based on documents provided by the Client Agent, the ADA parking lot is proposed to be constructed with flexible pavement for medium-duty traffic, for wheel loads up to 9,000 pounds. The pedestrian walkways are anticipated to be constructed for light-duty loading. The proposed new asphalt paving sections should be designed as discussed in Section 10.7. Due to the relatively high fines content of the native soils, frost heave susceptibility should be considered regarding longevity of the pavement.

Groundwater was observed at varying depths throughout the site. Within the footprint of the proposed concession building, groundwater was encountered at approximately 15 feet bgs; groundwater was observed between 8 and 10 feet bgs within the existing baseball and softball fields; groundwater was not encountered in the footprint of the proposed visitor bleachers, or within the footprints of the ADA parking lot and pedestrian walkways. It is not expected that groundwater will affect construction of the proposed concession building, bleachers, or dugouts, but perched groundwater will likely be encountered during construction throughout the sites. Depending on the final configuration of the proposed lighting structure foundations, groundwater may be encountered during construction of the drilled shaft foundations.

Due to relatively high fines content of the on-site soils, they should be considered to be sensitive to disturbance during excavation and/or compaction, when exposed to water. Therefore, it is critical that care be taken during construction of foundations and pavement subgrade preparation to prevent undue wetting of the soils. Due to the density and generally high fines content of the native till, it is expected to have relatively low permeability, and to be difficult to dewater. It should be noted that groundwater was observed throughout the site between 8 and 15 feet bgs, and may be encountered during the construction phase in a perched condition overlying the finer-grained soils. Grading of pavement subgrades to shed water and to prevent ponding will also be critical to prevent disturbance of the existing soils. Both of these conditions may require subgrade remediation during the construction of new structures and pavement sections, if adequate protection cannot be maintained. Subgrade disturbance can be minimized by using proper subgrade preparation techniques, as described in Section 11 of this report.

The following are other general conclusions that can be made regarding the proposed construction:

- Excavation should be feasible with conventional construction equipment; however, it should be noted that cobbles and boulders may be encountered during excavation.

- Due to their relatively high fines content, the soils found on-site are typically not suitable for use as structural fill. The existing fill and native soils should not be used as backfill behind foundation walls, because their high fines content will impede the proper drainage of the backfill. If used for general fill, these soils are moisture sensitive, and should be at or below optimum moisture content when placed and compacted, to achieve the specific degree of compaction and to provide a stable pavement subgrade. Construction delays should be expected, if the on-site soils are used.

- The results of our liquefaction analysis indicate that the soils underlying the site are unlikely to liquefy.

10.0 RECOMMENDATIONS

The following sections provide our geotechnical recommendations for design and construction of the proposed concession building, field lighting, bleachers, and asphalt paving. The recommendations are based on our understanding of the proposed construction, as described in Section 3, the results of our subsurface investigation and our experience in the general vicinity of the project site.

10.1 Concession and Press Box Building Foundations

The proposed concession and press box building can be supported on conventional shallow spread footings or continuous wall footings that bear on the medium dense to dense native soils. It should be noted that loose layers of native soil were observed between 15 and 32 feet within boring SB-1, and between 20 and 25 feet bgs within boring SB-2. If encountered during excavation, it is recommended that any soft and unsuitable soils encountered within the zone of influence of the building foundations are undercut, and replaced with properly compacted, structural fill.

Due to the dense nature of the soils at the anticipated bearing elevation, and the expected light loads for the building, our analysis indicates that the influence of the foundation loads will largely dissipate before reaching the depths of the loose layers. If any loose or unsuitable soils are encountered within the footprint of the concession building foundations, they should be removed from the zone of influence of the foundations, and replaced with compacted, structural fill. Spread and continuous wall footings for the new buildings and building additions bearing on medium dense native soils or compacted structural fill can be designed for a maximum net allowable soil bearing pressure of 2,000 pounds per square foot (psf). Section 11 of this report provides the subgrade preparation procedures necessary to achieve the recommended bearing capacity.

Using the above design criteria, total settlement of the proposed building is estimated to be up to 1 inch and differential settlements are estimated to be less than 0.5 inch. The differential settlement is estimated between columns and over a distance of about 30 feet along continuous footings. Continuous wall footings should have a minimum width of 2 feet and isolated spread footing should have a minimum width of 3.5 feet. All footings should bear at least 4 feet below the outside grade, for frost protection.

10.2 Concession and Press Box Slab-On-Grade Floors

Slab-on-grade floors should be supported on a minimum 6-inch-thick layer of free draining ½ to ¾ inch crushed stone placed over the existing in-place soils, or structural fill subgrades. If encountered, any loose fill that is encountered below the slab-on-grades should be removed and replaced with compacted structural fill prior to placement of crushed stone. All moisture-sensitive floor slabs should be constructed above a vapor barrier, consisting of a polyethylene membrane with a minimum thickness of twenty (20) mils. A coefficient of friction of 0.3 should be used between the slab and the vapor barrier. If concrete is cast directly against competent native soils, structural fill or existing fill, a coefficient of friction of 0.4 can be used.

A subgrade modulus of 150 pounds per cubic inch (pci) is recommended for design of slab-on-grade floors bearing on 6 inches of crushed stone base placed above the existing fill. The design should be in accordance with the latest edition of the American Concrete Institute (ACI 360). The subgrade modulus is suitable for estimating distributions of bearing pressure beneath the slab and for estimating bending moments and shears within the slab. It is not intended for calculating total or differential settlements.

10.3 Dugout Slabs

The dugout can be supported by a slab-on-grade assuming frost heave can be tolerated. Slabs for the proposed dugouts should be supported on a minimum 6-inch-thick layer of free draining ½ to ¾ inch crushed stone placed over the existing in-place soil, or structural fill subgrades. If encountered, any loose fill that is encountered below the slab-on-grades should be removed and replaced with compacted structural fill prior to placement of crushed stone. If concrete is cast directly against competent native soils, structural fill or existing fill, a coefficient of friction of 0.4 can be used. A subgrade modulus of 150 pounds per cubic inch (pci) is recommended for design of slab-on-grade floors bearing on 6 inches of crushed stone base placed above the existing fill. The design should be in accordance with the latest edition of the American Concrete Institute (ACI 360). The subgrade modulus is suitable for estimating distributions of bearing pressure beneath the slab and for estimating bending moments and shears within the slab. It is not intended for calculating total or differential settlements.

10.4 Design for Lateral Loading of Walls

Any foundation walls and temporary shoring should be designed in accordance with the following criteria:

Table 10.4.1 – Lateral Load Parameters		
Soil Parameter	On-Site Soil	Structural Fill
Angle of Internal Friction	32°	34°
Active Earth Pressure Coefficient (K_a) [1]	0.31	0.28
Passive Earth Pressure Coefficient (K_p) [2]	3.25	3.54
At-Rest Earth Pressure Coefficient (K_o) [3]	0.47	0.44
Unit Weight of Soil (pounds per cubic foot)	115	125
Coefficient of Base Friction	0.4	0.4

1) Use for freestanding walls, such as retaining walls, where movement of up to 0.0015 X height of wall is both possible and tolerable. Otherwise, use at-rest coefficient.

2) Reduce passive pressure by half above a depth of 4 feet below exterior grade to account for disturbance caused by frost action.

3) Use for walls restrained against outward lateral movement, such as foundation walls.

Additional loading due to temporary and permanent surcharges should be added to the lateral loading exerted by the retained soil. Loads due to supported structures should be applied in appropriate combinations with the lateral loads. Walls should be backfilled in accordance with Section 11.3 of this report. Placement and compaction of backfill should be observed and tested by a geotechnical engineer to monitor that proper compaction is being achieved.

10.5 Athletic Field Lighting Foundations

The proposed athletic field lighting structures can be supported on drilled shafts. Design for axial compressive loading can incorporate both end bearing and side resistance, while design for uplift load should only incorporate the side resistance and the pile weight. Drilled shaft foundations should bear at a minimum depth of 8 feet below proposed grade, or 3 times the shaft diameter, whichever is greater. The diameter and embedment depth of the proposed shafts are not known to Tectonic as of the writing of this report. Design parameters for drilled shaft foundations to be constructed adjacent to the multipurpose field to resist axial loading are provided in Table 10.5.1. Design parameters for drilled shaft foundations constructed

adjacent to the baseball/softball fields to resist axial loading are provided in Table 10.5.2. A design groundwater depth of 12 feet bgs should be used for the lighting structures constructed adjacent to the multipurpose field, and a design groundwater depth of 8 feet bgs should be used for lighting structures constructed adjacent to the baseball and softball fields.

Table 10.5.1 – Drilled Pier Design Parameters for Axial Loading (Multipurpose Field Lighting)		
Depth Interval below Existing Grade (feet)	Drilled Pier Parameters	
	Allowable Skin Friction (psf)	Allowable End Bearing Pressure (ksf)
0 – 4	0 – 80	N/A
4 – 8	175 – 320	N/A
8 – 15	320 – 525	6
15 – 32	525 – 630	6

Table 10.5.2 – Drilled Pier Design Parameters for Axial Loading (Baseball/Softball Field Lighting)		
Depth Interval below Existing Grade (feet)	Drilled Pier Parameters	
	Allowable Skin Friction (psf)	Allowable End Bearing Pressure (ksf)
0 – 4	0 – 80	N/A
4 – 8	165 – 300	N/A
8 – 15	300 – 375	4
15 – 32	375 – 500	6

Notes:
1. Skin friction varies linearly with depth and can be interpolated for piles terminated within a given depth interval.
2. Allowable side resistance has been reduced by half in the upper 4 feet to account for frost.
3. Allowable resistance based on a factor of safety of 2.
4. The range given for allowable end bearing pressure corresponds to the top and bottom of the depth interval, and values for intermediate depths can be linearly interpolated.
5. The pile weight should be included in the uplift capacity.

It is anticipated that the primary lateral loading on the lighting structures will be from wind loads. The soil parameters presented in Table 10.5.3 below are provided for design to resist lateral movement and for analyzing lateral deflection and lateral stability of shafts constructed adjacent to the multipurpose field. The parameters presented in Table 10.5.4 are provided for design of shafts constructed adjacent

to the baseball and softball fields. Lateral deflection at the top of the shaft should be checked using a computer program such as LPILE.

Table 10.5.3 – Lateral Load Design Parameters (Multipurpose Field Lighting)								
Soil Type	Depth Below Proposed Ground (ft)		γ'	c	ϕ'	K static	K_p	e_{50}
	From	To	(pcf)	(psf)	(deg)	(pci)		(in/in)
Upper Medium Dense to Dense Soils	0	10	115	0	34	90	1.77/ 3.54(1)	NA
Medium Dense Native Sand Soils	10	32	115/47.6 (2)	0	32	90/60 (2)	3.54	NA

Table 10.5.4 – Lateral Load Design Parameters (Baseball/Softball Field Lighting)								
Soil Type	Depth Below Proposed Ground (ft)		γ'	c	ϕ'	K static	K_p	e_{50}
	From	To	(pcf)	(psf)	(deg)	(pci)		(in/in)
Upper Medium Dense to Dense Soils	0	8	115	0	34	90	1.77/ 3.54(1)	NA
Loose to Medium Dense Native Soils	8	25	42.6	0	30	20	3.00	NA
Medium Dense to Dense Native Soils	25	32	52.6	0	34	60	3.54	NA

Where

γ' = Effective unit weight
c = Cohesion
φ' = Effective friction angle
Kstatic = LPILE soil modulus parameter
K_p = Passive earth pressure coefficient
e_{50} = Strain at 50 percent
NA = Not Applicable

Note:

1. The static passive resistances (Kp) within the top 4 feet of the piles have been cut by half to accommodate weakening from frost action.
2. The upper value is for soils above the water table and the lower value is for soils below the water table, which is assumed to be at a depth of 15 feet in the area of the multipurpose fields.

10.6 Groundwater and Foundation Drainage

Based on the results of our subsurface investigation, it is not anticipated that groundwater will affect the construction of the foundations of the concession building foundations, pavement sections, and bleachers, but may for the lighting structures. In addition, perched groundwater may be encountered during the construction phase. Rainwater and surface water may become trapped in excavations. If necessary, dewatering can be performed with sump pumps and should be performed to allow work to be performed in the dry. Any dewatering should prevent loosening or migration of the subgrade soils. The dewatering system, if necessary, should be designed by a New York State licensed Professional Engineer.

Grading of the surface of the backfill and the surrounding topography and pavements should provide positive drainage away from the walls. Roof drains should be positively drained to areas away from the building.

10.7 Bleacher Foundations

Bleachers are proposed to be constructed to the east of the existing multipurpose field. The upper soils within the athletic field generally consist of medium dense to dense sand and gravel soils. If encountered, loose soils in the zone of influence of the bleacher foundations should be removed, and replaced with compacted, granular fill. The proposed bleachers may be supported on shallow foundations that bear on the existing in-place soils at a minimum depth of 4 feet for protection from frost. Bleacher foundations can be designed for a maximum net allowable soil bearing pressure of 2,000 psf. Total settlements of up to 1/2 inch and differential settlements of up to 1/4 inch can be expected. Section 11 of this report provides the subgrade preparation procedures necessary to achieve the recommended bearing capacity.

10.8 Pavements

It is our understanding that the proposed site improvements include the construction of new asphalt paving sections for the proposed ADA parking lot, and pedestrian walkways. It is our understanding that no significant re-grading of the site will be performed to construct the pavement sections. Subgrade preparation and proofrolling should be performed in accordance with the recommendations provided in Section 11 of this report. For this report, the pavement design parameters were estimated by Tectonic, for medium duty traffic. The standard duty section was based upon a daily traffic of 200 vehicles, with 25 percent heavy trucks. An assumed twenty (20) year design life was used for each pavement section.

Light duty pavement sections may be used for the pedestrian walking paths, where vehicle traffic is not anticipated.

A design California Bearing Ratio (CBR) value of 5 was selected for the design of the asphalt pavement section. This CBR was selected based on the soils encountered on the site, and the compacted native soils that will support the pavement.

Based on the generally high fines content of the subgrade soils, and the high susceptibility of these soils to frost heave, the subgrade should be undercut by 1 foot, and a separation fabric (Mirafi® 180N or similar) should be placed between the in-place soils and a 1-foot layer of non-expansive granular structural fill for frost heave protection. We recommend that the pavement section consist of the following:

Table 10.8.1 - Asphalt Pavements	
Pavement Section Type	Recommended Section
Light Duty	1.5 inches Top Course HMA (Items 402.095102 or 402.125102) 4 inches Type 2 Aggregate Subbase (Item 304.12) 12 inches Select Granular Fill (Item 203.07)
Medium Duty	2 inches Top Course HMA (Items 402.095102 or 402.125102) 3 inches Binder Course HMA (Item 402.195102 or 402.255902) 6 inches Type 2 Aggregate Subbase (Item 304.12) 12 inches Select Granular Fill (Item 203.07)

Note:

1) All Item Numbers are indicated in New York State Department of Transportation Standard Specifications.

11.0 EARTHWORK CONSTRUCTION CRITERIA

The following sections present our recommendations regarding earthwork and construction monitoring.

11.1 General Site Preparation

Initially, the site of the proposed building, bleachers, lighting structures, and pavement sections should be cleared and grubbed, then stripped of all existing fill, pavement, topsoil and debris. The clearing and grubbing should extend at least 5 feet beyond the planned structures to be constructed. Any existing asphalt pavement within the footprints of the ADA parking lot and pedestrian walkway should be stripped

and removed. Debris and vegetation from the clearing operations should be removed from the site and disposed of at a legal disposal facility. All soft or unsuitable materials and subsurface obstructions should be removed from the building footprint and the zone of influence of the slab-on-grade or foundation. The zone of influence is defined by 1:1 (horizontal to vertical) planes sloping downward and outward from the bottom edges of the slab or footing.

Any existing utilities within the project limits should be re-routed around the foundations or removed. The resulting excavations should be backfilled with structural fill in accordance with the procedures outlined below. Any trench excavations should be properly benched to allow for adequate compaction.

11.2 Subgrade Preparation

All building and bleacher foundation, slab-on-grade, and pavement subgrades should be inspected by the geotechnical engineer prior to the placement of structural fill, concrete, or pavement subbase material. It is our understanding that significant re-grading will not be performed for the construction of the proposed concession building, bleachers, dugouts, or asphalt paving sections. Any cut areas of the site should be lowered to the planned subgrade depth, and the exposed native soils should be proofrolled to observe for potentially yielding soils. In any proposed fill areas, the surface should be cleared and grubbed, and the resulting subgrade prior to fill placement should also be proofrolled. Areas to receive structural fill should also be proofrolled before placing any backfill materials.

The foundation and pavement subgrades, and any surfaces to receive structural fill or concrete should be proofrolled under the observation of the geotechnical engineer. Proofrolling should be accomplished by making a minimum of four (4) passes in perpendicular directions with a 10-ton roller in open areas, or a 1.5-ton trench roller, where access is confined. Proofrolling should not be performed on saturated soils or in areas having freestanding surface water, until they are dewatered and allowed to dry. Proofrolling soils that exceed the optimum moisture content may disturb the soils, resulting in more unfavorable conditions. Unsuitable materials or areas identified to be soft by the geotechnical engineer, based on visual inspection and observation of proofrolling operations should be removed and replaced with compacted structural fill. Any subgrade soils found to be soft and yielding during proofrolling, or otherwise deemed unsuitable by the geotechnical engineer, should be removed and replaced with properly compacted structural fill.

11.3 Fill and Backfill Materials

Imported structural fill should be well-graded granular soil that meets the general gradation requirements for New York State Department of Transportation (NYSDOT) Type 2 Aggregate Subbase (Item 304.12), and as follows:

Sieve Size	Percent Finer by Weight
2 Inch	100
¼ Inch	25 to 60
No. 40	5 to 40
No. 200	0 to 10

Based on the results of our subsurface investigation and laboratory testing the native soils are not suitable for use as structural fill, due to the high fines content (up to 47 percent). Any soils that are to be used as structural fill should be tested and approved by the geotechnical engineer prior to use.

Non-conforming native soils may be suitable for use as general fill in landscaped areas, provided they are free of trash, debris, roots, vegetation, or other deleterious materials. It should be noted that use of soils containing moderately high silt contents (such as those encountered at the site) will likely cause construction delays during the winter months, following periods of wet weather, or if the material is wet when excavated.

All general fill and structural fill should be compacted to at least 95 percent of the maximum dry density, at near optimum moisture contents, as determined by the modified Proctor test (ASTM D1557). The degree of compaction should be tested and documented by a geotechnical engineer for each lift of fill. The lift thickness for the structural fill soils will vary depending on the type of compaction equipment used. Structural fill should generally be placed in uniform horizontal lifts not exceeding 8 inches in loose thickness when using a 10-ton roller. In confined areas, the loose lift thickness should be 4 inches or less and each lift should be compacted with sufficient passes of hand operated vibratory or impact compaction equipment. A geotechnical engineer with appropriate field and laboratory support should inspect all subgrades, approve materials for use as fill, and test backfill materials for compliance with the recommended compaction.

Free draining crushed stone placed below floor slabs and as drainage materials behind foundation walls should be Underdrain Filter Type I materials (Item No. 733.2001) as specified in the NYSDOT Standard Specifications and as follows:

Sieve Size	Percent Finer by Weight
1 inch	100
1/2 inch	30 - 100
1/4 inch	0 - 30
No. 4	0 - 10
No. 8	0 – 5

Select granular fill to be placed below the subbase material for the asphalt paving sections should be a well-graded durable granular material that meets the gradation requirements for Select Granular Fill (Item 203.07).

11.4 Protection of Subgrades and Construction Dewatering

Approved soil subgrades should be protected from the effects of frost, construction traffic, perched groundwater, surface water and precipitation. The necessary protection should be provided as soon after approval by the geotechnical engineer as is practicable and should be maintained until coverage with compacted fill or gravel. It is recommended that temporary surface drainage measures be installed to divert runoff away from the proposed construction limits.

Based on the conditions observed during the subsurface investigation, perched groundwater may be encountered during the construction phase. If necessary, dewatering should be performed in a manner that will prevent loosening or migration of the subgrade soils and performed to maintain the water level at least 1 foot below the deepest excavation. Given the dense nature and high fines content of the on-site soils, it is anticipated that sump pits and pumps may be suitable for dewatering. Sump pits should be placed at least 1 foot outside of excavations for every foot below the subgrade elevation that they are excavated. The dewatering system should be designed by a New York State Licensed Professional Engineer, and it should be designed to ensure that dewatering does not result in any loss of soil.

As has been previously noted, the on-site soils contain a high percentage of fines and they will soften and experience a reduction in load-carrying capacity when exposed to moisture and disturbed. They may also become unworkable if allowed to get wet. These soils are also frost susceptible and could become disturbed if allowed to freeze during construction. Additional excavation and material removal may be required if subgrades are allowed to be exposed for long durations without fill or concrete placement. Additionally, construction traffic could also disturb the native soils.

If maintaining subgrade stabilization during periods of wet weather is a concern, crushed stone may be placed on footing and/or floor subgrades after excavation and proofrolling. The crushed stone should be clean ½ to ¾ inch gravel, stone, or recycled concrete, and should not exceed 6 inches in thickness.

11.5 Excavations and Shoring

Temporary excavation slopes should conform to the latest OSHA standards, including slopes permitted for specified heights and soil conditions encountered. The presence of perched water, or other deleterious materials could require flatter slopes or temporary excavation support (e.g., shoring and bracing). Excavation support may also be necessary in areas where sufficient distance to provide adequate benching of slopes is not available.

Excavations into the existing fill and native soil should be feasible using standard construction equipment (i.e. hydraulic excavator). Cobbles and boulders should be expected within both the existing fill and within the undisturbed glacial till. Design of dewatering and excavation support should conform to the latest OSHA and other applicable agency requirements. Design of all excavation slopes greater than a 4-foot depth and design of sheeting, shoring, and bracing should be performed by a New York State licensed Professional Engineer. Adequate dewatering or surface-water runoff control should be provided to avoid instability and caving of soils.

11.6 Deep Foundation Construction Considerations

Drilled shaft foundations should be constructed in accordance with the most recent standards of the International Association of Foundation Drilling (ADSC), the Code, and ACI 336. Plans and specifications should clearly indicate that variable soil conditions are present, and obstructions, likely in the form of cobbles and boulders, are present in the native soils. This will allow the contractor to employ the appropriate equipment and construction methodologies. The foundations should also be constructed under the full-time observation of the geotechnical engineer.

Due to the granular nature of the subsurface soils, a temporary steel casing may be needed to prevent collapse of the soils into the excavations, and drilling slurry may be required to maintain the sidewall stability below the groundwater level. At the time of the subsurface investigation, groundwater was observed at approximately 15 feet bgs adjacent to the multipurpose field, and between 8 and 10 feet bgs adjacent to the baseball fields. The embedment depth of the shafts is not known as of the writing

of this report, so groundwater may potentially be encountered when installing the shafts. The temporary casing could be extended to the full depth of the pile in lieu of the drilling slurry, provided that the casing is removed while concrete is placed. Removal of the casing should be performed so that the level of the concrete within the casing is always at least 1-foot above the bottom of the casing.

Concrete placement associated with the drilled piles should be performed utilizing a concrete pump and using tremie methods to prevent segregation of the concrete. If casing is used, concrete placement should be done in a manner to prevent "necking" of the drilled pile.

12.0 CONSTRUCTION MONITORING

A geotechnical engineer familiar with the existing subsurface conditions and having the appropriate laboratory and field-testing support should be engaged by the Client to observe that all earthwork is performed in accordance with the specifications, the Code, and the criteria provided in this report. As a minimum, the following work should be performed under the observation of the geotechnical engineer:

- Subgrade preparation
- Proofrolling
- Remedial removals of unsuitable soils
- Placement and compaction of fill and backfill materials
- Construction of drilled shafts for lighting structures
- Dewatering, if necessary

All materials proposed for use as soil fill should be tested and approved prior to delivery to the site. Additionally, all fill materials should be tested as they are being placed to verify that the required compaction is achieved. We further recommend that Tectonic be retained to review the project plans and specifications prior to completion of the bid documents.

13.0 LIMITATIONS

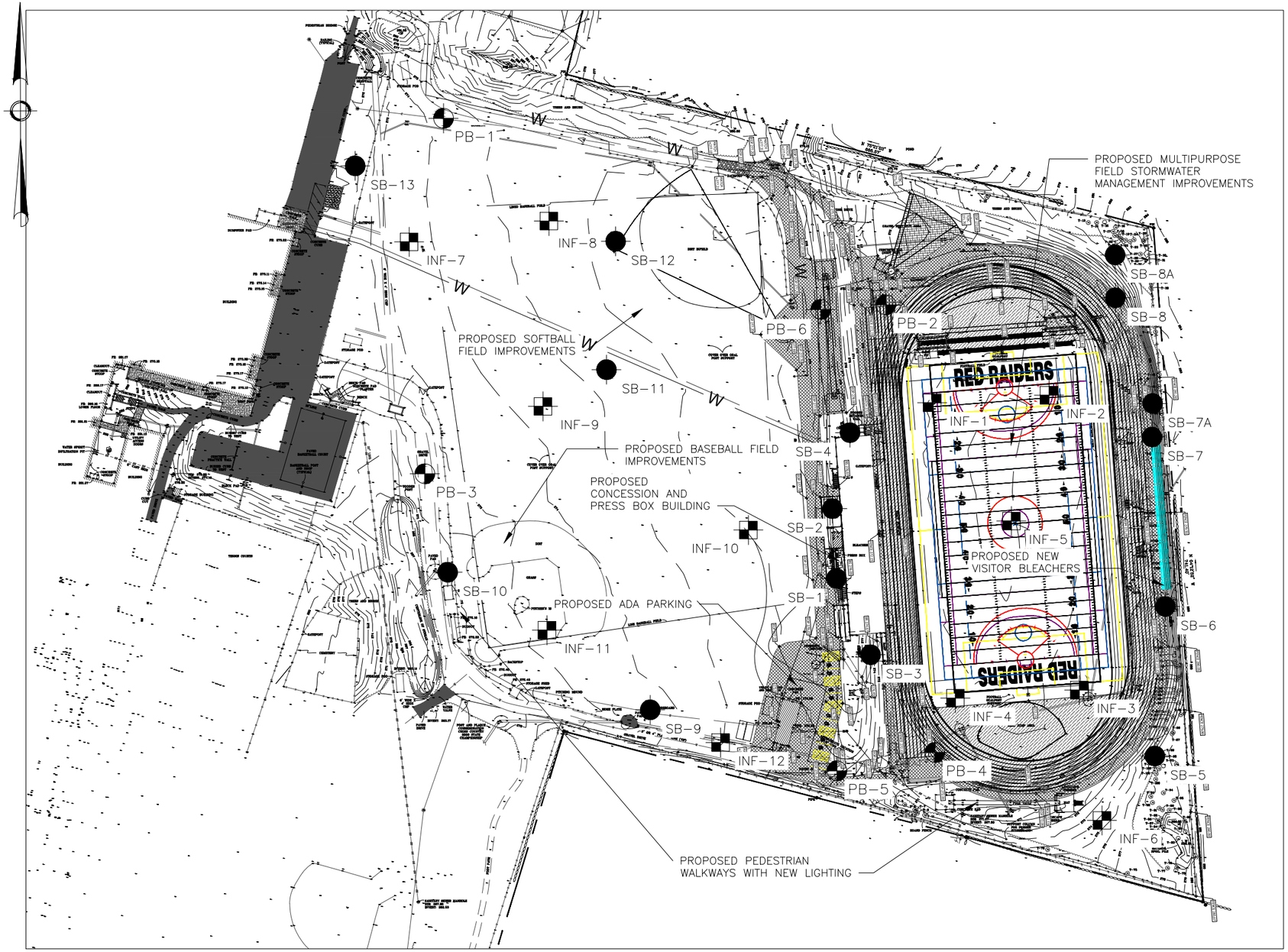
Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report. The recommendations contained in this report are intended for design purposes

only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the soil and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of The LA Group, for the specific application to the proposed construction detailed in this report. We recommend that prior to construction; Tectonic Engineering Consultants, Geologists, and Land Surveyors D.P.C. reviews the project plans and specifications. It should be noted that upon review of those documents, some recommendations presented herein might be revised or modified. In the event that any changes in the design or location of the proposed structures are planned, Tectonic shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

SC/CBB: G:\Newburgh\Geotechnical\11500\11584.01 North Rockland High School\Report\11584.01 North Rockland High School improvements geoinv.docx

FIGURE I



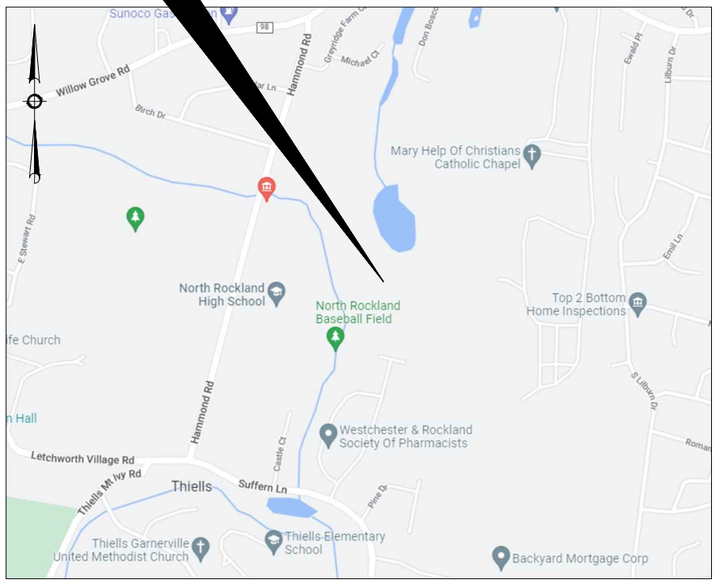
LEGEND

- PB-6 — APPROXIMATE PAVEMENT BORING LOCATION
- SB-13 — APPROXIMATE STRUCTURAL BORING LOCATION
- INF-12 — APPROXIMATE INFILTRATION TEST LOCATION

NOTES

1. PLAN BASED ON A SITE SURVEY PROVIDED BY THE LA GROUP DATED 05/2022.
2. BORINGS AND INFILTRATION TEST LOCATIONS WERE FIELD LOCATED BY TECTONIC AND SHOULD BE CONSIDERED APPROXIMATE.

SITE



0 1 2 3

ORIGINAL SIZE IN INCHES

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.
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Phone: (845) 534-5959
(800) 829-6531
www.tectonicengineering.com
Project Contact Info
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656

BORING AND INFILTRATION TEST LOCATION PLAN

PROPOSED ATHLETIC FACILITY IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NY

Date	Work Order	Drawing No.	Rev
10/13/2022	11584.01	FIGURE I	0
Scale 1" = 125'			

APPENDIX I

Tectonic

BORING No. PB-1

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **274.5**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ 1 2 3 4 5
PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50
● STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	24	4, 9, 15, 13	S-1	16		M	SW-SM	1" Topsoil-like material Bwn c-f SAND, and f Gravel, little Silt (FILL)		
3	43	21, 21, 22, 22	S-2	11		M	SM	Bwn-gy c-f SAND, some c-f Gravel, little Silt (FILL)		
5	24	12, 14, 10, 16	S-3	22		M	SM	Same (FILL)		269.5
7								End of Boring at 6'		
10										264.5
15										259.5
20										254.5
25										249.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. PB-2

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	14	15 6 8 17	S-1	15		M	GM	Red track surface, 2" asphalt, 3" subbase gravel Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)		
3	56	21 31 25 21	S-2	19		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
5	28	16 14 14 11	S-3	10		M	SM	Bwn-gy c-f SAND, and c-f Gravel, little Silt		267.0
6								End of Boring at 6'		
10										262.0
15										257.0
20										252.0
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-3

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **271.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	50	13 17 33 36	S-1	16		M	GM	4" gravel surface Bwn c-f GRAVEL, and m-f Sand, little Silt (FILL)		
3	55	21 30 25 26	S-2	17		M	GM	Gy-bwn c-f GRAVEL, some c-f Sand, little Silt (FILL)		
5	30	14 16 14 11	S-3	9		M	GM	Same (FILL)		266.0
7								End of Boring at 6'		
10										261.0
15										256.0
20										251.0
25										246.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-4

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	13	10 5 8 9	S-1	13		M	SM	Red track surface, 1" asphalt, 3" subbase gravel Bwn c-f SAND, some f Gravel, little Silt (FILL)		
3	18	12 7 11 15	S-2	18		M	SM	Bwn c-f SAND, some c-f Gravel, little Silt		
5	21	19 13 8 6	S-3	19		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel		267.0
6								End of Boring at 6'		
10										262.0
15										257.0
20										252.0
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-5

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **276.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	40	14, 19, 21, 12	S-1	12		M	GM	3" gravel surface Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
3–4	21	8, 13, 8, 6	S-2	10		M	SM	Bwn-tn c-f SAND, little f Gravel, little Silt		
5–6	20	10, 10, 10, 12	S-3	19		M	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		271.0
								End of Boring at 6'		
10										266.0
15										261.0
20										256.0
25										251.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-6

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	27	11 16 11 15	S-1	16		M	SM	3" topsoil-like material Bwn c-f SAND, and c-f Gravel, little Silt (FILL)		
3	38	15 21 17 15	S-2	11		M	SM	Same (FILL)		
5	28	14 14 14 12	S-3	16		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt		273.0
6								End of Boring at 6'		
10										268.0
15										263.0
20										258.0
25										253.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-1

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **40'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	18	5, 7, 11, 15	S-1	20		M	SM	3" gravel surface Bwn-gy c-f SAND, some c-f Gravel, little Silt (FILL)		
3–4	35	20, 18, 17, 11	S-2	20		M	GW-GM	Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)		
5–6	16	11, 10, 6, 9	S-3	10		M	GW-GM	Same (FILL)		274.0
7–8	23	10, 12, 11, 9	S-4	9		M	SM	Bwn-gy c-f SAND, some c-f Gravel, little Silt		
9–10	14	8, 8, 6, 6	S-5	19		M	SM	Bwn c-f SAND, some c-f Gravel, little Silt		269.0
11–12	10	5, 6, 4, 5	S-6	18		M	SM	Bwn c-f SAND, little Silt, trace c-f Gravel		
13–14										
15–16	6	3, 3, 3, 3	S-7	18		W	SM	Bwn c-f SAND, little Silt, trace c-f Gravel		264.0
17–18										
19–20										259.0
21–22	8	WOR, 4, 4, 4	S-8	21		W	SM	Same		
23–24										
25										254.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-1

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	1	WOH 0 1 1	S-9	10		W	SM	Bwn-gy c-f SAND, and Silt		
27										
28										
29										
30										249.0
31	8	2 4 4 3	S-10	18		W	SM	Gy m-f SAND, and Silt		
32										
33										
34										
35										244.0
36	9	1 3 6 9	S-11	16		W	ML	Gy-rd SILT, some m-f Sand, some c-f Gravel		
37										
38										
39										
40										239.0
41	33	8 15 18 16	S-12	16		W	ML	Rd-gy SILT, some c-f Gravel, some c-f Sand		
42										
43								End of Boring at 42'		
44										
45										234.0
46										
47										
48										
49										
50										229.0
51										
52										
53										
54										
55										224.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-2

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **25'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	8	8 4 4 5	S-1	14		M	SM	3" gravel surface Bwn-gy c-f SAND, some c-f Gravel, little Silt (FILL)		
3	15	4 6 9 10	S-2	9		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
5	33	15 15 18 11	S-3	18		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, some Silt (FILL)		274.0
7	12	8 7 5 10	S-4	16		M	SM	Bwn-gy c-f SAND, some c-f Gravel, some Silt		
9	22	12 12 10 7	S-5	14		M	SM	Same		
10										269.0
11	15	8 8 7 7	S-6	14		M	SM	Same		
15										264.0
16	10	4 5 5 5	S-7	8		W	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		
20										259.0
21	5	3 3 2 2	S-8	22		W	SM	Bwn-gy m-f SAND, some Silt, trace c-f Gravel		
25										254.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-2

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	20	12 10 10 9	S-9	24		W	SM	Bwn c-f SAND, and c-f Gravel, little Silt		
27										
28								End of Boring at 27'		
30										249.0
35										244.0
40										239.0
45										234.0
50										229.0
55										224.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-3

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **65° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **9/15/22**
DATE FINISH: **9/15/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	11	4 6 5 5	S-1	10		M	GM	3" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)	
3	28	6 11 17 16	S-2	16		M	GM	Same (FILL)	
5	14	13 8 6 4	S-3A S-3B	18		M	SM ML	8" Bwn c-f SAND, some c-f Gravel, little Silt (FILL) 10" Or-bwn SILT, some m-f Sand, trace c-f Gravel	273.0
7	34	11 14 20 18	S-4	20		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt	
9	72	17 24 48 37	S-5	18		M	GM	Bwn-gy c-f GRAVEL, some m-f Sand, little Silt	
10	50+	50/3	S-6	3		M	SM	Gy-wht c-f SAND, little c-f Gravel, little Silt	268.0
15									263.0
16	14	8 8 6 3	S-7	16		W	SM	Bwn c-f SAND, little Silt, trace c-f Gravel	
20									258.0
21	15	4 7 8 6	S-8	18		W	SM	Bwn-or c-f SAND, some Silt, trace c-f Gravel	
25									253.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-3

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	4	2 2 2 2	S-9	14		W	SM	Tn-or c-f SAND, and Silt		
27										
28										
29										
30										248.0
31	3	2 0 3 2	S-10	20		W	ML	Gy-or SILT, and m-f Sand		
32										
33								End of Boring at 32'		
34										
35										243.0
36										
37										
38										
39										
40										238.0
41										
42										
43										
44										
45										233.0
46										
47										
48										
49										
50										228.0
51										
52										
53										
54										
55										223.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-4

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **276.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	23	4, 10, 13, 16	S-1	8		M	GM	4" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
3–4	32	22, 22, 10, 12	S-2	8		M	SM	Bwn c-f SAND, some Silt, little c-f Gravel		
5–6	24	6, 11, 13, 10	S-3	18		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt		271.0
7–8	24	11, 10, 14, 11	S-4	17		M	SM	Bwn-gy c-f SAND, some c-f Gravel, little Silt		
9–10	28	11, 12, 16, 12	S-5	17		M	SM	Same		266.0
11–12	13	8, 8, 5, 7	S-6	20		M	SM	Tn m-f SAND, some Silt		
13–14										
15–16	9	4, 4, 5, 22	S-7	18		W	SM	Bwn c-f SAND, little Silt, trace f Gravel		261.0
17–18										
19–20										256.0
21–22	10	2, 5, 5, 5	S-8	24		W	SM	Gy m-f SAND, little Silt		
23–24										
25										251.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-4

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

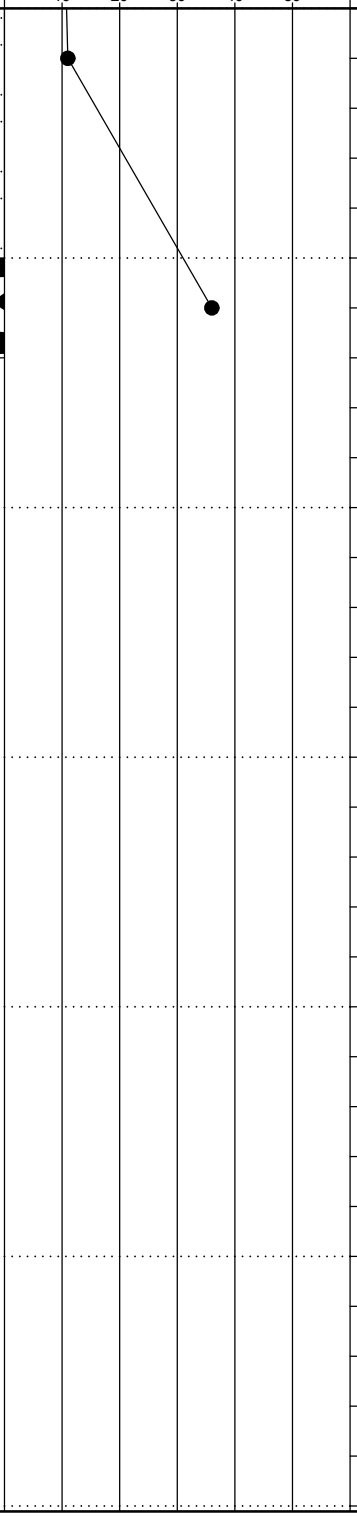
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	11	3 5 6 7	S-9	14		W	SM	Bwn m-f SAND, and Silt		
27										
28										
29										
30										246.0
31	36	24 13 23 14	S-10	12		W	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt		
32										
33								End of Boring at 32'		
34										
35										241.0
36										
37										
38										
39										
40										236.0
41										
42										
43										
44										
45										231.0
46										
47										
48										
49										
50										226.0
51										
52										
53										
54										
55										221.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50



REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-5

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **15'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	11	1 3 8 10	S-1	16		M	SM	6" topsoil-like material Bwn c-f SAND, some Silt, little c-f Gravel (FILL)		
3	29	8 15 14 9	S-2	17		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel		
5	28	6 18 10 7	S-3	14		M	GM	Bwn c-f GRAVEL, some c-f Sand, some Silt		273.0
7	14	8 8 6 6	S-4	20		M	SM	Bwn m-f SAND, and Silt, little f Gravel		
9	14	8 8 6 9	S-5	12		M	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		268.0
11	39	22 16 23 28	S-6	24		M	GM	Bwn c-f GRAVEL, some c-f Sand, some Silt		
15	50+	63 50/2	S-7	8		M	GM	Bwn c-f GRAVEL, little c-f Sand, little Silt Auger refusal at 16 feet bgs		263.0
								End of Boring at 16'		
										258.0
										253.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-6

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **20'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	6	1 3 3 4	S-1	15		M	SM	3" topsoil-like material Bwn c-f SAND, some c-f Gravel, little Silt (FILL)		
3	14	6 6 8 7	S-2	6		M	GM	Bwn-gy c-f GRAVEL, little c-f Sand, little Silt (FILL)		
5	13	12 8 5 5	S-3	16		M	SM	Bwn-gy c-f SAND, and c-f Gravel, some Silt		274.0
7	21	21 17 4 3	S-4	18		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel		
9	27	8 12 15 8	S-5	10		M	GM	Bwn-gy c-f GRAVEL, some Silt, some c-f Sand		269.0
11	27	3 11 16 16	S-6	10		M	ML	Bwn SILT, some c-f Sand, little c-f Gravel		
13										
15										264.0
16	40	7 19 21 33	S-7	20		M	ML	Bwn-gy SILT, some c-f Gravel, little c-f Sand		
18										
20	50+	50/0	S-8					No recovery in spoon Auger refusal at 20 feet bgs		259.0
21								End of Boring at 20'		
22										
23										
24										
25										254.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-7

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **4'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

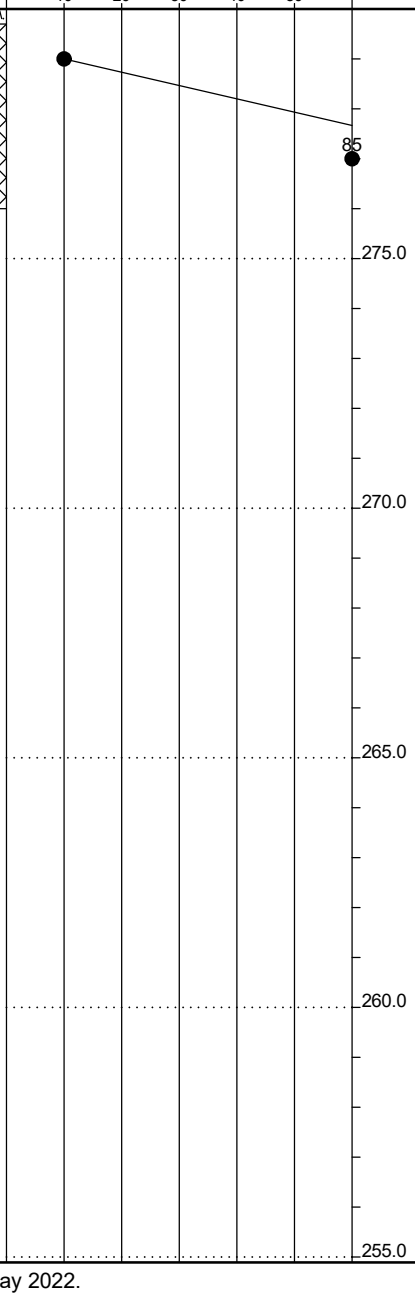
GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	10	3 5 5 5	S-1	8		M	GM	3" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
2										
3	85+	29 35 50/2	S-2	9		M	GM	Same (FILL) Auger refusal at 4 feet bgs See Boring SB-7A		
4										
5								End of Boring at 4'		275.0
6										
7										
8										
9										
10										270.0
11										
12										
13										
14										
15										265.0
16										
17										
18										
19										
20										260.0
21										
22										
23										
24										
25										255.0



REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-7A

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **20'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **80° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–4								Boring SB-7A offset 3 feet north of boring B-7. No SPT sampling performed to 4 feet bgs		
5–6	47	24 26 21 17	S-1	24		M	SM	Bwn m-f SAND, some Silt, some c-f Gravel		275.0
7–8	24	12 12 12 10	S-2	18		M	SM	Same		
9–10	27	15 16 11 10	S-3	14		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt		270.0
11–12	28	28 16 12 12	S-4	9		M	GM	Bwn-blk-gy c-f GRAVEL, and Silt, little c-f Sand		
13–15										265.0
16	50+	50 50/2	S-5	4		M	GM	Gy-bwn c-f GRAVEL, little Silt, trace c-f Sand		
17–20										260.0
20	50+	50/0	S-6	0				No recovery in spoon Auger refusal at 20 feet bgs		
21–25								End of Boring at 20'		255.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-8

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **8'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Rain** TEMP: **72° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **281.0**
DATUM: **See Remarks**
DATE START: **9/13/22**
DATE FINISH: **9/13/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	9	3 4 5 9	S-1	19		M	SM	3" topsoil-like material Bwn c-f SAND, some Silt, trace c-f Gravel (FILL)		
3	45	15 20 25 23	S-2	23		M	SM	Bwn-tn c-f SAND, some Silt, little c-f Gravel		
5	51	20 27 24 27	S-3	24		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, some Silt		276.0
7	50+	50/4	S-4	4		M	SM	Bwn c-f SAND, some c-f Gravel, some Silt Drilled to 8 feet bgs, auger refusal at 8 feet See Boring SB-8A		
8								End of Boring at 8'		
10										271.0
15										266.0
20										261.0
25										256.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-8A

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **20'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **281.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–8								Boring B-8A offset 7 feet north of boring B-8. No SPT sampling performed to 8 feet		276.0
9–10	13	11 7 6 5	S-1	14		M	GP-GM	Bwn c-f GRAVEL, and m-f Sand, trace Silt		271.0
11–12	18	6 6 12 13	S-2	12		M	SM	Bwn c-f SAND, some Silt, little c-f Gravel		
13–15										266.0
16	115+	23 65 50/3	S-3	10		M	SM	Bwn-gy c-f SAND, some c-f Gravel, some Silt		115
17–20										261.0
20	50+	50/4	S-4	4		M	GM	Gy-bwn c-f GRAVEL, some c-f Sand, little Silt		
21–25								End of Boring at 20.3'		256.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-9

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **9/15/22**
DATE FINISH: **9/15/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	40	2 10 30 13	S-1	15		M	GM	4" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
3	30	9 9 21 29		18		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, some Silt (FILL)		
5	58	20 32 26 23	S-3	14		M	GM	Gy-wht-bwn c-f GRAVEL, some c-f Sand, little Silt (FILL)		267.0
7	35	19 17 18 15	S-4	16		M	SW-SM	Bwn c-f SAND, and f Gravel, little Silt		
9	12	7 7 5 4	S-5	12		W	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt		262.0
11	6	3 3 3 WOH	S-6	6		W	GM	Same		
13										
15										257.0
16	22	10 13 9 6	S-7	6		W	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		
18										
20										252.0
21	5	2 3 2 4	S-8	18		W	SM	Bwn c-f SAND, some Silt, trace m-f Gravel		
23										
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-9

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	7	5 3 4 6	S-9	24		W	SM	Bwn c-f SAND, and Silt, little c-f Gravel		
27										
28										
29										
30										242.0
31	4	WOH 2 2 4	S-10	12		W	SM	Bwn c-f SAND, and Silt, trace c-f Gravel		
32										
33								End of Boring at 32'		
34										
35										237.0
36										
37										
38										
39										
40										232.0
41										
42										
43										
44										
45										227.0
46										
47										
48										
49										
50										222.0
51										
52										
53										
54										
55										217.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-10

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **25'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **80° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **9/15/22**
DATE FINISH: **9/15/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	34	6, 6, 28, 16	S-1	10		M	GM	3" topsoil-like material Bwn-gy c-f GRAVEL, and c-f Sand, little Silt (FILL)		
3	33	12, 16, 17, 12	S-2	14		M	GM	Same (FILL)		
5	7	9, 5, 2, 2	S-3	13		M	ML	Bwn SILT, and f Sand, little c Gravel		267.0
7	5	2, 2, 3, 2	S-4	18		M	SM	Gy c-f SAND, and Silt		
9	12	3, 5, 7, 6	S-5	18		W	SM	Bwn-or c-f SAND, some Silt, little c-f Gravel		
11	15	6, 7, 8, 8	S-6	24		W	SM	Bwn c-f SAND, some Silt, little c-f Gravel		262.0
13										
15										257.0
16	7	2, 4, 3, 3	S-7	20		W	SM	Bwn c-f SAND, some m-f Gravel, little Silt		
18										
20										252.0
21	28	4, 10, 18, 15	S-8 S-8A	18		W	SM GM	Top 9" Bwn-gy c-f SAND, some Silt, trace m-f Gravel Bottom 9" Gy-rd c-f GRAVEL, some c-f Sand, some Silt		
23										
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-10

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	33	31 23 10 9	S-9	18		W	GM	Same		
27								End of Boring at 27'		242.0
30										237.0
35										232.0
40										227.0
45										222.0
50										217.0
55										

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-11

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **275.5**
DATUM: **See Remarks**
DATE START: **8/26/22**
DATE FINISH: **8/26/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	20	2, 11, 9, 12	S-1	14		M	SM	4" topsoil-like material Bwn c-f SAND, some Silt, little c-f Gravel (FILL)		
3	23	14, 10, 13, 14	S-2	16		M	GM	Bwn-wht c-f GRAVEL, and Silt, some c-f Sand (FILL)		
5	11	9, 6, 5, 3	S-3	7		M	SW-SM	Bwn c-f SAND, and f Gravel, trace Silt		270.5
7	3	2, 1, 2, 1	S-4	3		M	SW-SM	Bwn c-f SAND, and f Gravel, trace Silt		
9	6	2, 2, 4, 2	S-5	0				No Recovery		
11	6	3, 3, 3, 7	S-6	3		W	SM	Bwn c-f SAND, little f Gravel, little Silt		265.5
13										
15										260.5
16	4	2, 2, 2, 2	S-7	22		W	SM	Bwn m-f SAND, little Silt, trace f Gravel		
18										
20	2	WOH, 1, 1, WOH	S-8	24		W	SM	Same		255.5
22										
25										250.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-11

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	8	4 4 4 4	S-9	12		W	SM	Same		
27										
28										
29										
30										245.5
31	9	3 4 5 9	S-10	15		W	SM	Bwn m-f SAND, little Silt, trace f Gravel		
32										
33								End of Boring at 32'		
34										
35										240.5
36										
37										
38										
39										
40										235.5
41										
42										
43										
44										
45										230.5
46										
47										
48										
49										
50										225.5
51										
52										
53										
54										
55										220.5

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-12

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **26.5'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **276.5**
DATUM: **See Remarks**
DATE START: **8/26/22**
DATE FINISH: **8/26/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	29	11 14 15 16	S-1	9		M	SM	3" topsoil-like material Bwn m-f SAND, some Silt, trace c-f Gravel (FILL)		
3	12	11 7 5 5	S-2	10		M	SM	Bwn c-f SAND, and f Gravel, little Silt (FILL)		
5	27	7 12 15 9	S-3	12		M	GM	Bwn-wht c-f GRAVEL, some c-f Sand, some Silt (FILL)		271.5
7	14	6 7 7 10	S-4	15		M	SM	Bwn c-f SAND, little f Gravel, little Silt		
16	11	8 5 6 3	S-5	3		W	SM	Bwn c-f SAND, and f Gravel, little Silt		266.5 / 261.5
21	16	6 7 9 9	S-6	10		W	SM	Bwn-gy c-f SAND, little f Gravel, little Silt		256.5 / 251.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-12

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	81+	4 31 50/2	S-7	18		W	GM	Gy-rd c-f GRAVEL, some c-f Sand, little Silt Auger refusal at 26.5 feet bgs		81
27								End of Boring at 26.5'		
30										246.5
35										241.5
40										236.5
45										231.5
50										226.5
55										221.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-13

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **273.0**
DATUM: **See Remarks**
DATE START: **8/26/22**
DATE FINISH: **8/26/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	29	3, 13, 16, 20	S-1	16		M	SM	2" topsoil-like material Bwn c-f SAND, some f Gravel, little Silt (FILL)		
3			S-2	0				Drilled through obstruction between 2 and 4 feet bgs, no sample obtained		
5	16	7, 8, 8, 9	S-3	8		M	SM	Bwn m-f SAND, some Silt, little f Gravel		268.0
7	18	5, 6, 12, 13	S-4	18		M	GM	Bwn-blk-wht c-f GRAVEL, some c-f Sand, little Silt		
9	21	10, 9, 12, 9	S-5	16		M	SM	Bwn c-f SAND, little f Gravel, little Silt		263.0
11	18	7, 8, 10, 4	S-6	24		W	SM	Bwn c-f SAND, and c-f Gravel, little Silt		
13										
15										258.0
16	25	10, 14, 11, 6	S-7	14		W	SM	Bwn c-f SAND, little f Gravel, little Silt		
18										
20										253.0
21	28	14, 14, 14, 10	S-8	9		W	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt		
23										
25										248.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-13

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	56	20 27 29 40	S-9	7		W	SM	Gy-bwn c-f SAND, little f Gravel, little Silt		
27										
28										
29										
30	50+	50/0	S-10	0				No recovery in spoon Auger refusal at 30 feet bgs		243.0
31								End of Boring at 30'		
32										
33										
34										
35										238.0
36										
37										
38										
39										
40										233.0
41										
42										
43										
44										
45										228.0
46										
47										
48										
49										
50										223.0
51										
52										
53										
54										
55										218.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

LEGEND FOR SOIL DESCRIPTION

COARSE GRAINED SOIL (Coarser then No. 200 Sieve)

DESCRIPTIVE TERM & GRAIN SIZE

TERM	SAND					GRAVEL
coarse - c	No.	4	Sieve to No.	10	Sieve	3" to 3/4"
medium - m	No.	10	Sieve to No.	40	Sieve	3/4" to 3/16"
fine - f	No,	40	Sieve to No.	200	Sieve	

COBBLES 3" to 10"

BOULDERS 10" +

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
fine, f	Less than 10% coarse to medium
medium to fine, m-f	Less than 10% coarse
medium, m	Less than 10% coarse and fine
coarse to medium, c-m	Less than 10% fine
coarse, c	Less than 10% medium and fine
coarse to fine, c-f	All greater than 10%

FINE GRAINED SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0 - 1	none
Clayey Silt	2 - 5	slight
Silt & Clay	6 - 10	low
Clay & Silt	11 - 20	medium
Silty Clay	21 - 40	high
Clay	greater than 40	very high

PROPORTION

DESCRIPTIVE TERM	PERCENT OF SAMPLE WEIGHT
trace	1 - 10
little	10 - 20
some	20 - 35
and	35 - 50

The primary component is fully capitalized

COLOR

Blue - blue	Gy - gray	Wh - white
Blk - black	Or - orange	Yl - yellow
Bwn - brown	Rd - red	Lgt - light
Gn - green	Tn - tan	Dk - dark

SAMPLE NOTATION

S - Split Spoon Soil Sample
U - Undisturbed Tube Sample
C - Core Sample
B - Bulk Soil Sample
NR - No Recovery of Sample

WOC - Weight of Casing
WOR - Weight of Rods
WOH - Weight of Hammer
PPR - Compressive Strength based on Pocket Penetrometer
TV - Shear Strength (tsf) based on Torvane

ADDITIONAL CLASSIFICATIONS

New York City Building Code soil classifications are given in parentheses at the end of each description of material, if applicable. See sections 1804.2 of the 2008 Building Code for further details.

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/9/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Sunny Temperature: 97 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
INF-1	5'	4"	7:30AM		1.0	1.0	2.0	2.0		2.0
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-1 performed in northwest corner of existing turf field adjacent to running track.										
INF-2	5'	4"	7:40AM		3.0	0.0	4.0	1.0		2.0
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-2 performed in northeast corner of existing turf field adjacent to running track.										

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/9/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Sunny Temperature: 97 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-3	5'	4"	7:50AM		19.0	20.0	19.0	19.0	19.0
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-3 performed in southeast corner of existing turf field adjacent to running track.									
INF-4	5'	4"	8:00AM		24.0	24.0	24.0	24.0	24.0
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-4 performed in southwest corner of existing turf field adjacent to running track.									

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/9/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Sunny Temperature: 97 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-5	5'	4"	8:10AM		20.0	18.0	19.0	18.0	18.8
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-5 performed in the center of existing turf field adjacent to running track.									
INF-6	5'	4"	8:20AM		8.0	2.0	0.5	0.0	2.6
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-6 advanced within landscape area to the south of the existing running track.									

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/10/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Partly Cloudy Temperature: 85 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
INF-7	5'	4"	7:30AM		23.0	14.0	12.0	12.0		15.3
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-7 advanced in the northwest corner of the existing soccer field for proposed softball field.										
INF-8	5'	4"	7:40AM		5.0	7.0	24.0	24.0		15.0
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-8 advanced in the northeast corner of the existing soccer field for proposed softball field.										

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/10/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Partly Cloudy Temperature: 85 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-9	5'	4"	7:50AM		24.0	24.0	24.0	21.0	23.3
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-9 advanced in the southern end of the existing soccer field for proposed baseball field.									
INF-10	5'	4"	8:00AM		24.0	24.0	16.0	13.0	19.3
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-10 advanced in the southeast corner of the existing athletic field for proposed baseball field.									

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/10/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Partly Cloudy Temperature: 85 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-11	5'	4"	8:10AM		13.0	16.0	12.0	12.0	13.3
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-11 advanced in the existing baseball field for the proposed baseball field improvements (near first base).									
INF-12	5'	4"	8:20AM		24.0	24.0	24.0	24.0	24.0
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-12 advanced in the existing baseball field for the proposed baseball field improvements (near right field).									

Sketch Requirements

(To Be Completed On Back of Sheet)

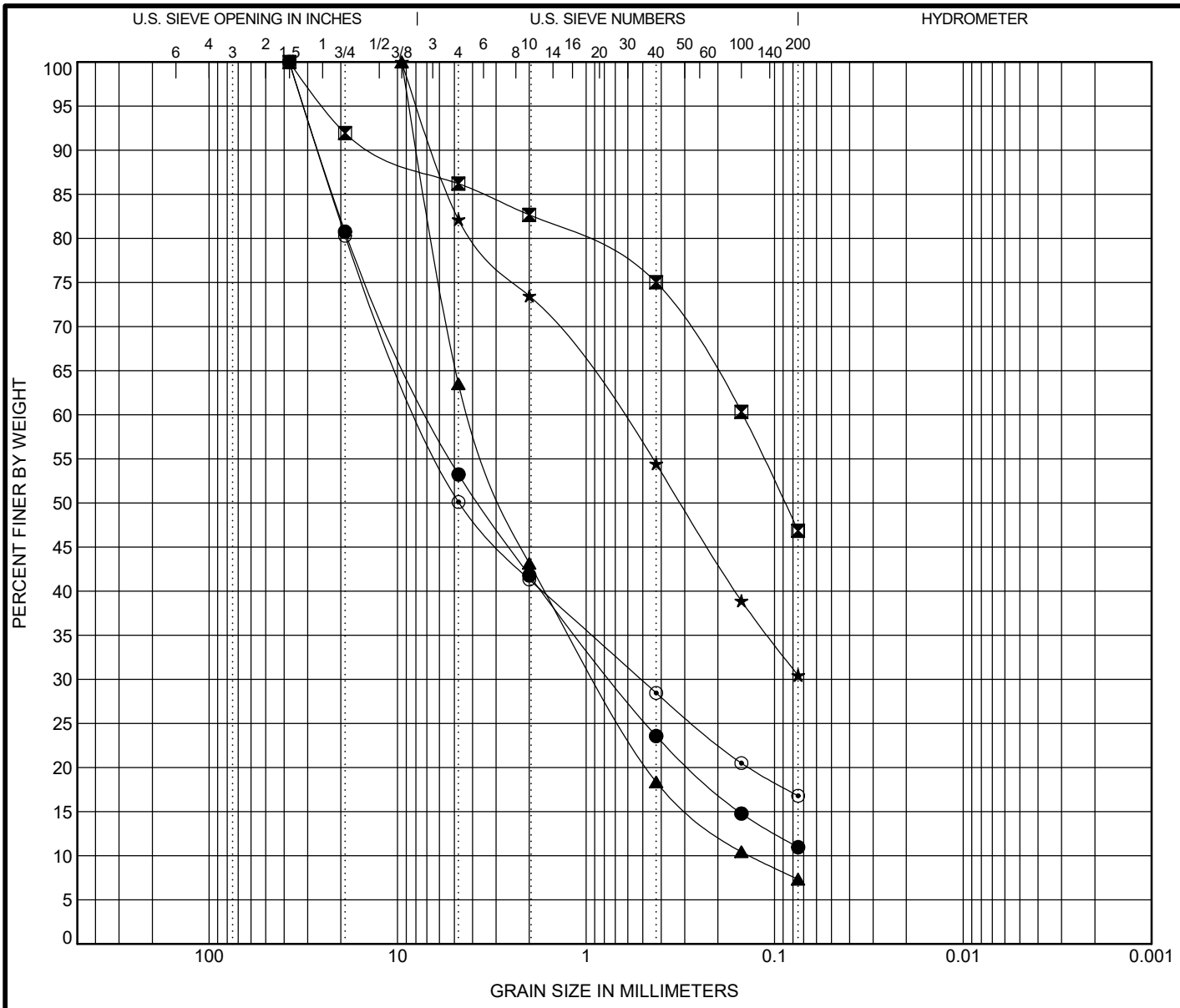
Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

APPENDIX II



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-1	2.0	S-2	Bwn c-f GRAVEL, and c-f Sand, little Silt	4.3				1.28	106.13
⊠	B-10	4.0	S-3	Bwn SILT, and f Sand, little c Gravel	22.5					
▲	B-11	6.0	S-4	Bwn c-f SAND, and f Gravel, trace Silt	3.3				1.39	30.14
★	B-13	4.0	S-3	Bwn m-f SAND, some Silt, little f Gravel	3.6					
⊙	B-3	8.0	S-5	Bwn-gy c-f GRAVEL, some m-f Sand, little Silt	4.7					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	B-1	2.0	S-2	37.5	6.679	0.734		46.8	42.3	11.0		Boring
⊠	B-10	4.0	S-3	37.5	0.147			13.8	39.4	46.8		Boring
▲	B-11	6.0	S-4	9.5	4.091	0.88	0.136	36.5	56.2	7.3		Boring
★	B-13	4.0	S-3	9.5	0.668			17.9	51.7	30.5		Boring
⊙	B-3	8.0	S-5	37.5	7.482	0.512		49.9	33.3	16.8		Boring

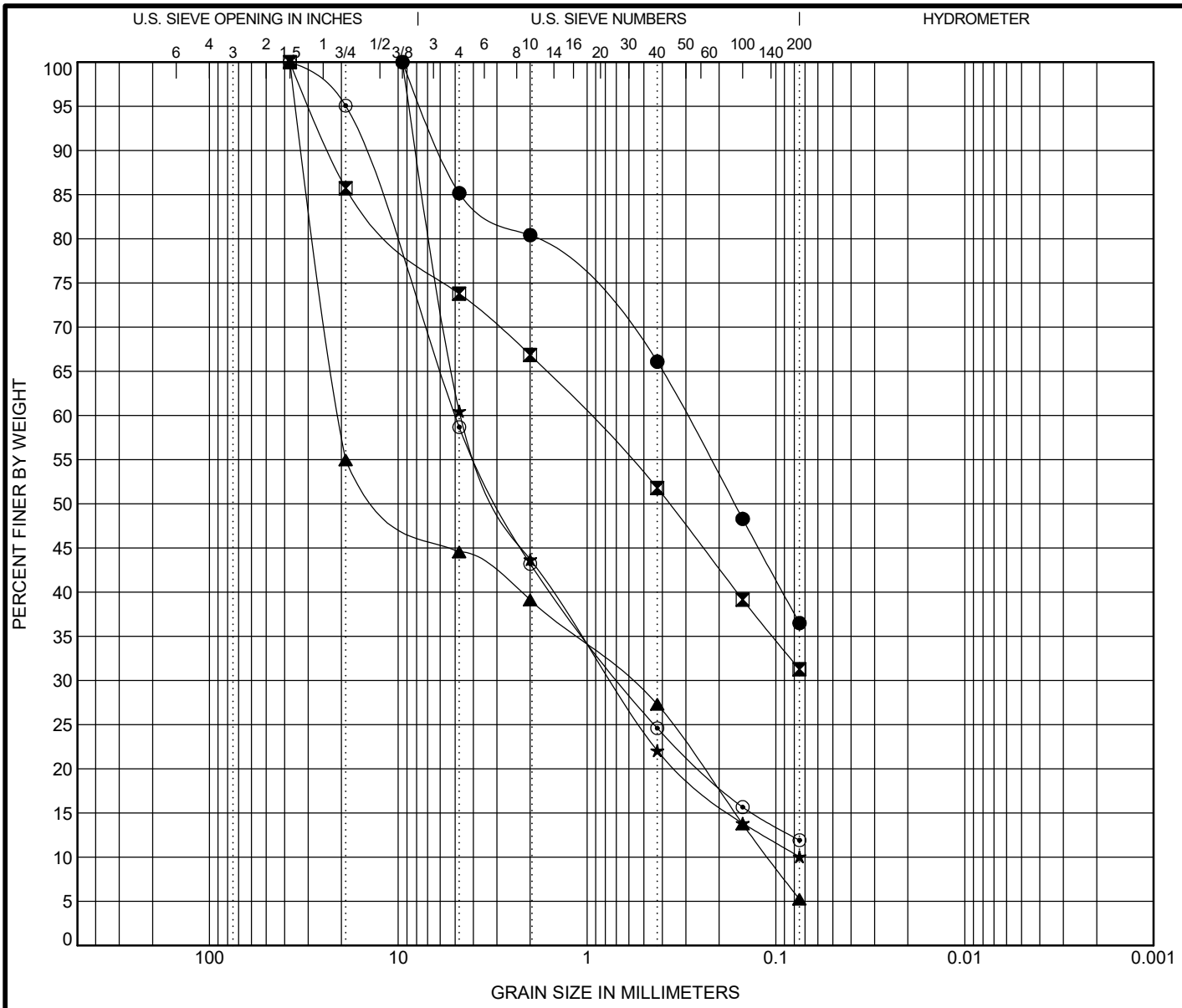
Tectonic
280 Little Britain Road, Bldg 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-5	6.0	S-4	Bwn m-f SAND, and Silt, little f Gravel	11.9					
⊠	B-7A	4.0	S-1	Bwn m-f SAND, some Silt, some c-f Gravel	6.7					
▲	B-8A	8.0	S-1	Bwn c-f GRAVEL, and m-f Sand, trace Silt	8.6				0.16	185.38
★	B-9	6.0	S-4	Bwn c-f SAND, and f Gravel, little Silt	3.7				1.63	62.36
⊙	PB-1	0.0	S-1	Bwn c-f SAND, and f Gravel, little Silt	2.5				1.69	94.84

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	B-5	6.0	S-4	9.5	0.298			14.8	48.7	36.5		Boring
⊠	B-7A	4.0	S-1	37.5	0.989			26.2	42.5	31.3		Boring
▲	B-8A	8.0	S-1	37.5	20.504	0.606	0.111	55.5	39.3	5.2		Boring
★	B-9	6.0	S-4	9.5	4.634	0.75		39.5	50.4	10.1		Boring
⊙	PB-1	0.0	S-1	37.5	4.996	0.666		41.3	46.8	11.9		Boring

Tectonic
280 Little Britain Road, Bldg 2
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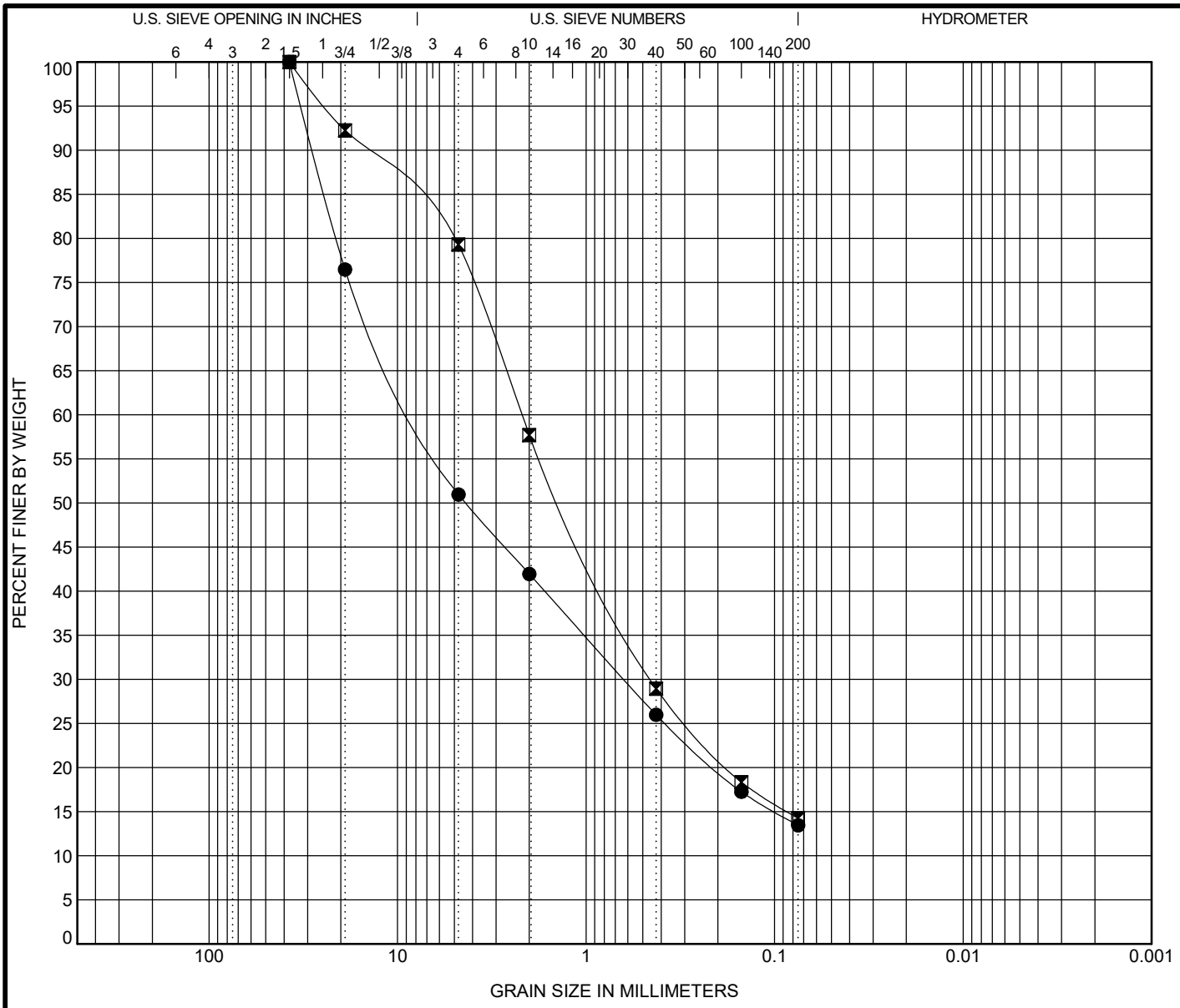
GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	**PB-3**	**0.0**	**S-1**	**Bwn c-f GRAVEL, and m-f Sand, little Silt**	**2.9**					
⊠	**PB-4**	**0.0**	**S-1**	**Bwn c-f SAND, some f Gravel, little Silt**	**3.3**					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	**PB-3**	**0.0**	**S-1**	**37.5**	**7.763**	**0.628**		**49.0**	**37.5**	**13.4**		**Boring**
⊠	**PB-4**	**0.0**	**S-1**	**37.5**	**2.194**	**0.45**		**20.7**	**65.1**	**14.2**		**Boring**

Tectonic
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Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**

GRAIN SIZE DISTRIBUTION 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Boring #	Depth (Ft.)	Sample #	Specimen Description % Gravel : % Sand : % Fines	USCS	Water Content	Liquid Limit	Plastic Limit	Plasticity Index	Penetro-meter (tsf)	Torvane (tsf)	Dry Density (pcf)	Organic Content (%)	pH
B-1	2.0	S-2	Bwn c-f GRAVEL, and c-f Sand, little Silt 46.8 : 42.3 : 11.0		4								
B-10	4.0	S-3	Bwn SILT, and f Sand, little c Gravel 13.8 : 39.4 : 46.8		23								
B-11	6.0	S-4	Bwn c-f SAND, and f Gravel, trace Silt 36.5 : 56.2 : 7.3		3								
B-13	4.0	S-3	Bwn m-f SAND, some Silt, little f Gravel 17.9 : 51.7 : 30.5		4								
B-3	8.0	S-5	Bwn-gy c-f GRAVEL, some m-f Sand, little Silt 49.9 : 33.3 : 16.8		5								
B-5	6.0	S-4	Bwn m-f SAND, and Silt, little f Gravel 14.8 : 48.7 : 36.5		12								
B-6	10.0	S-6	Bwn SILT, some c-f Sand, little c-f Gravel **NON-PLASTIC: WILL NOT ROLL TO 1/8"**		13								
B-7A	4.0	S-1	Bwn m-f SAND, some Silt, some c-f Gravel 26.2 : 42.5 : 31.3		7								
B-8A	8.0	S-1	Bwn c-f GRAVEL, and m-f Sand, trace Silt 55.5 : 39.3 : 5.2		9								
B-9	6.0	S-4	Bwn c-f SAND, and f Gravel, little Silt 39.5 : 50.4 : 10.1		4								
PB-1	0.0	S-1	Bwn c-f SAND, and f Gravel, little Silt 41.3 : 46.8 : 11.9		2								
PB-3	0.0	S-1	Bwn c-f GRAVEL, and m-f Sand, little Silt 49.0 : 37.5 : 13.4		3								
PB-4	0.0	S-1	Bwn c-f SAND, some f Gravel, little Silt 20.7 : 65.1 : 14.2		3								

Tectonic

280 Little Britain Road, Bldg 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

Summary of Laboratory Results

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**

Our Story

For the past 30 years, Tectonic has delivered quality professional services in a timely and cost effective manner by pooling its talented staff into project teams that think, act, and perform as one integral unit. By carefully listening and collaborating with its clients, the firm is able to identify the key issues and assure stakeholder objectives are met in the final deliverables. Through innovating and adopting technological advances, the firm is able to generate unique solutions to improve our nation's deteriorating infrastructure and build safe sustainable communities.

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Tectonic

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Phone: 845-534-5959
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SECTION 020500 - REPORTS ON EXPLORATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including other Division 1 and Technical Specification Sections apply to this Section.

1.02 SUMMARY

A. Section includes reference data collected by the Owner prior to the bidding period as follows:

1. Geotechnical evaluation of the site.

1.03 INVESTIGATIONS

A. Geotechnical investigations titled Geotechnical Evaluation Proposed Athletic Facility Improvements North Rockland High School, dated October 20, 2022 were performed by Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. 1279 Route 300, Newburgh, NY 12550.

B. Bidders are encouraged to examine the data and to make their own visual investigations of the site before bidding.

C. Contractors may perform additional test borings and other exploratory operations at no additional cost to the Owner upon approval of the Construction Manager and Architect.

1.04 REPORTS

A. Any Prime Contractor, both during bidding and after execution of the Contract, are permitted to investigate the nature, character, quality and quantity of above ground and below ground conditions apt to be encountered. Any reliance on data made available by the Owner is at the Contractor's risk.

B. No claim whatsoever shall be made by any Prime Contractor against the Owner or the Project Designer for, or on account of such available data, or neglected of such data to be made available by the Owner or the Project Design team.

1.05 INTERPRETATIONS

A. Geotechnical data is provided with the Bidding Documents only for information and the convenience of Bidders. The Owner, Construction Manager and Architect disclaim any responsibility for the accuracy, true location and extent of the geotechnical investigation that has been prepared by others. They further disclaim responsibility for the interpretation of the data by Bidders, as in projecting subsurface logs and classifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 APPENDIX

A. Geotechnical Evaluation Proposed Athletic Facility Improvements North Rockland High School, dated October 20, 2022 were performed by Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. 1279 Route 300, Newburgh, NY 12550.

END OF SECTION 020500

Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

GEOTECHNICAL EVALUATION
PROPOSED ATHLETIC FACILITY IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

Submitted To:

North Rockland Central School District

106 Hammond Road
Thiells, New York 10984
October 20, 2022

W.O. 11584.01

Submitted By:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.

1279 Route 300, 2nd Floor
Newburgh, NY 12550
(P) 845.567.6656
(F) 845.567.6248

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

North Rockland Central School District
106 Hammond Road
Thiells, New York 10984

Attention: C/O: Mr. Joe Kral Jr., Landscape Architect/Project Manager– The LA Group
Via email: (jkral@thelagroup.com)

October 20, 2022

RE: W.O. 11584.01
GEOTECHNICAL EVALUATION
NORTH ROCKLAND CENTRAL SCHOOL DISTRICT
NORTH ROCKLAND HIGH SCHOOL
PROPOSED ATHLETIC FACILITY IMPROVEMENTS
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

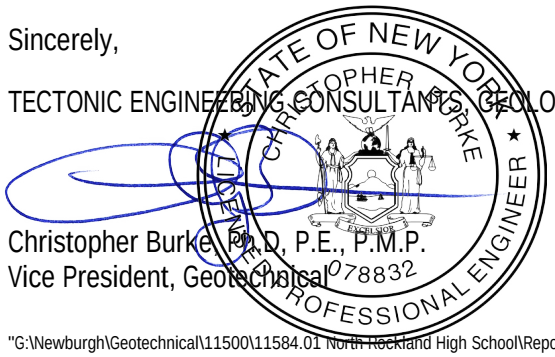
Dear Mr. Kral:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. is pleased to submit this subsurface investigation and geotechnical engineering evaluation for the proposed new building and site improvements to the athletic facility of the North Rockland High School campus, in the Hamlet of Thiells, New York. The purpose of the investigation was to evaluate the subsurface conditions within the areas of proposed site improvements, and to provide geotechnical recommendations for design and construction of the proposed new structures and improvements. This report presents detailed information about the investigations, our findings and recommendations.

We appreciate this opportunity to assist you with this project. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

TECTONIC ENGINEERING CONSULTANTS, GEOLOGISTS & LAND SURVEYORS, D.P.C.



Christopher Burke, Ph.D, P.E., P.M.P.
Vice President, Geotechnical

"G:\Newburgh\Geotechnical\11500\11584.01 North Rockland High School\Report\TEC Cover Letter.docx"

Newburgh Office

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GEOTECHNICAL EVALUATION
PROPOSED ATHLETIC FACILITY IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

TABLE OF CONTENTS

1.0 INTRODUCTION

In accordance with your request and authorization, Tectonic Engineering Consultants, Geologists, and Land Surveyors D.P.C. (Tectonic) has completed a subsurface investigation and geotechnical engineering evaluation for the proposed structures and site improvements within the athletic facility at North Rockland High School. The purpose of the investigation was to evaluate the subsurface conditions within the areas of improvements, and to provide geotechnical recommendations for the design and construction of the proposed structures and site improvements. This report presents detailed information about the investigation, our findings, and recommendations.

2.0 SCOPE OF SERVICES

The geotechnical investigation was performed for North Rockland Central School District (hereafter referred to as the Client), and coordinated through The LA Group, herein referred to as Client Agent. The scope of the geotechnical investigation consisted of the following:

- Review of geological information publicly available through the United States Geological Survey (USGS) and the National Resources Conservation Service (NRCS).
- Drilling, sampling, and logging of test borings and infiltration tests within the areas of the proposed new structures and site improvements. These included:
    - Fifteen (15) structural borings, designated as borings SB-1 through SB-13, SB-7A, and SB-8A, for the proposed new concession building, new bleachers, new athletic field lighting, and new baseball and softball field dugouts.
    - Six (6) pavement borings, designated as borings PB-1 through PB-6, for proposed new asphalt-paved pedestrian walkways and an ADA parking lot.
    - Drilling and performance of twelve (12) infiltration tests, designated as INF-1 through INF-12, for the proposed improvements to the stormwater management of the existing fields.
- Field inspection by a Tectonic representative, working under the supervision of a New York State licensed Professional Engineer, to locate the borings and infiltration tests; and log and classify all soil samples.
- Laboratory testing of soil samples selected to verify the field classifications of the soils, and to evaluate the engineering characteristics of the soil.
- Geotechnical engineering analyses of the subsurface conditions as they relate to the design and construction of the proposed structures, pavement sections, and site improvements.
- Preparation of this report presenting the results of the subsurface investigation, engineering analyses, and our geotechnical recommendations for the design and construction for the geotechnical aspects of the proposed site improvements.

3.0 SITE AND PROJECT DESCRIPTIONS

The project site is located on the campus of North Rockland High School, located at 106 Hammond Road, in the Hamlet of Thiells, Town of Haverstraw, Rockland County, New York. The campus contains an existing three-story high school building within the southwestern portion of the campus, and existing athletic facilities within the northern and eastern portions of campus. There are existing asphalt-paved parking lots adjacent to the north, west, south, and southeast of the existing school building. The improvements are proposed to be constructed within the athletic facility to the east of the school building. The project site is bound by the school building to the west, wooded areas to the north and east, and a line of trees that separates the athletic field from residential structures to the south. As of the writing of this report, the eastern athletic facility contains existing baseball, softball, and soccer fields on the western half of the site, and a multipurpose turf field with a perimeter running track on the eastern half of the site.

Based on a review of a historical topographic survey provided by the USGS, entitled "Ramapo Quadrangle", dated 1891, a branch of Minisceongo Creek previously extended through the center of the high school campus in a north-south alignment. A review of topographic surveys provided by the USGS between 1910 and 1931 indicate that the creek was filled in, and the site was re-graded. Based on a topographic survey provided by the Client Agent, site grades within the existing baseball and softball fields generally slope downwards from east to west, with surface elevations between approximately +277 and +273 feet. Site grades within the existing multipurpose field slope gently from east to west, with surface elevations between +273 and +272 feet. Site grades within the proposed ADA parking lot to the southwest of the multipurpose field gently slope downwards from north to south, with surface elevations between approximately +278 and +276 feet. All elevations referenced herein are per the North American Vertical Datum of 1988 (NAVD88).

The proposed project will reportedly be completed in two phases; the first phase will include new stormwater management systems for the existing multipurpose field, a new concession building with a second-floor press box, new pedestrian walkways, and lighting structures to the west of the track, expanded bleachers to the east of the track, a perimeter pedestrian walkway adjacent to the track, and an ADA parking lot to the southwest of the multipurpose field. Based on architectural drawings provided by the Client Agent, the new concession building is not proposed to have a below-grade basement. The second phase will include improvements to the existing baseball and softball fields, which will include new synthetic turf fields, field lighting, dugouts, bullpens, bleachers, and pedestrian walkways to the west of the field.

Based on architectural plans provided by the Client Agent, the new concession building will reportedly be approximately 1,800 square feet (sf) in area and will be constructed adjacent to the existing bleachers to the west of the multipurpose field. Stairs to the press box will be constructed to the south of the concession building. Due to the preliminary nature of the project, structural loading values were not available, but it is anticipated that the building will be relatively lightly loaded. The proposed baseball and softball field dugouts are proposed to be constructed at existing grade. Based on conversations with the Client Agent, significant re-grading of the site to construct the proposed improvements is not expected; however, no finished floor elevations were provided for any of the proposed structures.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling, sampling, and logging of twenty-one (21) total borings within the eastern athletic facility, designated as borings SB-1 through SB-13, SB-7A, and SB-8A (structural borings), PB-1 through PB-6 (pavement borings); and the drilling and performance of twelve (12) infiltration tests, designated as INF-1 through INF-12. Borings SB-7A and SB-8A were offset from borings SB-7 and SB-8 respectively, due to relatively shallow obstructions encountered during sampling. The test locations were generally performed at the Client Agent requested locations. The boring and infiltration test locations are shown on the attached Boring and Infiltration Test Location Plan, Figure 1.

The borings were drilled by Core Down Drilling, LLC., between August 9 and September 15, 2022, using track-mounted CME 55LC and Geoprobe 7822DT drill rigs, equipped with automatic hammers. The borings were advanced using 3-¼-inch inside-diameter hollow-stem augers. Within the structural borings, Standard Penetration Testing (SPT) was conducted with a split-spoon sampler continuously to depths of up to 12 feet, and then 5-foot maximum intervals thereafter. Within the pavement borings, SPT sampling was performed continuously to a depth of 6 feet. SPT sampling was performed in general accordance with the requirements of ASTM Standard D1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".* SPT N-values were recorded for each soil sample taken. Samples of the soil obtained during the investigation were retained in glass jars, and are currently stored at our material testing laboratory. The boreholes were backfilled with grout to match the existing conditions.

The infiltration tests were performed within 4-inch diameter holes drilled within the existing athletic fields. Infiltration tests INF-1 through INF-5 were advanced within the existing turf multipurpose field; INF-6 was advanced to the south of the multipurpose field; INF-7 and INF-8 were advanced within the existing softball field,

in the northwest corner of the athletic facility; INF-9 through INF-12 were advanced within the existing baseball field, in the southwest corner of the athletic facility. The locations of the infiltration tests are also shown on Figure 1. The infiltration test holes were drilled to depths of approximately 60 inches. Each infiltration test was performed in accordance with the requirements dictated by New York State, including a pre-soak and measurement over four (4) one-hour intervals. Upon completion, the infiltration test holes were backfilled with drill cuttings.

A geotechnical engineer observed the subsurface investigation and prepared logs of the subsurface conditions, under the purview of a Professional Engineer licensed in New York State. All materials encountered were classified in accordance with the Unified Soil Classification System (ASTM D2488), and the Modified Burmister Soil Classification System. Copies of the boring and infiltration test logs are included in Appendix I.

5.0 LABORATORY TESTING

Laboratory testing was performed on soil samples selected to assist in evaluating the engineering properties of the encountered soils and to help in field identifications of the soils. Testing included the performance of twelve (12) grain-size distribution tests, performed in general accordance with ASTM Standard D6913, and one (1) Atterberg limits determination, performed in general accordance with D4318. The results of the laboratory testing are included in Appendix II.

6.0 OVERALL SUBSURFACE CONDITIONS

A review of USGS and New York State geologic maps and surveys indicates that the site is generally underlain by fine sandy loam, and upper layers of fill in the western portion of the existing baseball field and has been previously re-graded. Based on the results of the subsurface investigation, the site is generally underlain by an upper layer of fill and native till soils. The fill soils are likely a mixture of re-worked native soils and imported fill to construct the athletic facility. The following sections provide generalized descriptions of the soils and groundwater conditions encountered in the borings. Detailed descriptions of the subsurface conditions are provided in the boring and infiltration test logs included in Appendix I.

As noted above, an automatic hammer was used in the SPT sampling of the borings. Given that an automatic hammer imparts more energy into the split spoon sampler than a safety hammer (N_{60}) – the standard hammer used for most geotechnical engineering calculations – an energy correction factor of 1.3 is applied to the field N-values to obtain the N_{60}-values.

6.1 Proposed Concession and Press Box Building

Borings SB-1 and SB-2 were advanced within the footprint of the concession and press box building, to the west of the multipurpose field and adjacent to the existing bleachers. Underlying a thin layer of gravel, a layer of fill soils was encountered to a depth of approximately 6 feet below existing ground (bgs). The fill soils generally consisted of brown-gray coarse-to-fine sand and gravel, with varying amounts of fines. Field SPT N-values within the fill ranged from 8 to 35 blows per foot (bpf). When corrected, SPT N_{60}-values ranged from approximately 10 to 46 bpf, corresponding to a medium dense to dense condition. Laboratory results of a soil sample tested indicates that the fill soils within the footprint of the concession and press box building are comprised of between approximately 20 and 46 percent coarse-to-fine gravel, 20 to 42 percent coarse-to-fine sand, and 11 to 20 percent passing the #200 sieve. The fill soils have USGS designations of SM, GW-GM, and GM.

Underlying the fill soils in both borings, native soils were encountered to the termination depths explored. The native soils generally consisted of variable-colored coarse-to-fine sand, with varying amounts of coarse-to-fine gravel and fines. Exceptions occurred in pockets where silt (boring SB-1 from approximately 35 to 42 feet bgs) and gravel (boring SB-2 from approximately 15 to 20 feet bgs) were encountered as the primary material component. Field SPT N-values within the native soils ranged from 1 to 35 bpf. When corrected, SPT N_{60}-values ranged from approximately 1 to 45 bpf, corresponding to a very loose to dense condition. Based on the SPT N_{60}-values, loose layers of native soils were encountered between 15 and 30 feet within boring SB-1, and between 15 and 20 feet within boring SB-2. The native soils within the footprint of the concession and press box building are comprised of between approximately 0 and 61 percent coarse-to-fine gravel, 20 to 45 percent coarse-to-fine sand, and 10 to 45 percent passing the #200 sieve. The native soils have USCS designations of SM, GM, and ML.

As indicated on the boring logs, saturated soil conditions were observed within the native soils in the footprint of the concession and press box building at a depth of approximately 15 feet in borings SB-1 and SB-2. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions and may be encountered in a perched condition overlying the finer-grained soils.

6.2 Proposed Multipurpose Field Improvements

Borings SB-3 through SB-8, SB-7A and SB-8A were advanced in the vicinity of the existing multipurpose field for the proposed new field lighting structures, and new visitors bleacher stands to the east of the multipurpose field. Borings SB-3 and SB-4 were advanced to the west of the multipurpose field and borings SB-5 through SB-8, SB-7A and SB-8A were advanced to the east of the multipurpose field. Boring SB-7 was terminated at auger refusal at a depth of 4 feet bgs. Boring SB-7A was then offset approximately 3 feet north of boring SB-7. Boring SB-8 was terminated at auger refusal at a depth of 8 feet bgs. Boring SB-8A was then offset approximately 7 feet north of SB-8. Borings SB-7 and SB-8 were likely terminated on cobbles or boulders. Underlying a thin veneer of topsoil-like material, fill soils were encountered to approximate depths between 2 and 6 feet bgs. The fill soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. Field SPT N-values within the fill soils ranged from 6 bpf to sampler refusal, which is defined as less than 6 inches of sampler penetration for 50 blows of the hammer. When corrected, SPT N_{60}-values ranged from approximately 8 bpf to sampler refusal, indicating a loose to very dense condition. The fill soils have USCS classifications of SM and GM.

Underlying the fill, native soils were encountered to the termination depths of the borings. It should be noted that borings SB-6, SB-7A, and SB-8A were terminated at auger refusal at depths between approximately 16 and 20.3 feet bgs. The native soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. Layers of silt were encountered between 30 and 32 feet bgs within boring SB-3 and between 10 and 20 feet bgs within boring SB-6. Field SPT N-values within the native soils ranged from 3 bpf to sampler refusal. When corrected, SPT N_{60}-values ranged from approximately 4 bpf to sampler refusal, indicating a very loose to very dense condition. The native soils within the footprint of the proposed lighting structures were generally observed in a medium dense to dense condition; the only loose layers were observed between 30 and 32 feet bgs within boring SB-3, and between 0 and 2 feet bgs within boring SB-6. Laboratory results of soil samples tested indicate that the native soils within the footprints of the proposed lighting structures are comprised of approximately 15 to 55 percent coarse-to-fine gravel, 33 to 49 percent coarse-to-fine sand, and 5 to 36 percent passing the #200 sieve. The native soils have USCS designations of SM, GP-GM, GM, and ML.

Infiltration tests INF-1 through INF-5 were advanced within the existing multipurpose turf field, and infiltration test INF-6 was advanced to the southeast of the multipurpose field for the proposed stormwater management system. SPT sampling was not performed within the infiltration test holes. The results of the infiltration tests are provided on the attached Infiltration Test logs, Appendix I.

As indicated on the boring logs, saturated soil conditions were observed within the native soils in the vicinity of the multipurpose field at a depth of approximately 15 feet within borings SB-3 and SB-4.

6.3 Proposed Baseball/Softball Field Improvements

Borings SB-9 through SB-13 were advanced within the existing baseball and softball fields on the western portion of the athletic facility for the proposed new field lighting, dugouts, and associated baseball field improvements. Underlying a thin veneer of topsoil-like material, the subsurface conditions generally consisted of fill soils, underlain by native sand, silt, and gravel soils.

Fill soils were encountered in all borings to approximate depths between 4 and 6 feet bgs. The fill soils generally consisted of brown coarse-to-fine sand and gravel, with varying amounts of fines. Field SPT N-values within the fill soils ranged from 12 to 58 bpf. When corrected, SPT N_{60}-values ranged from approximately 16 to 75 bpf, indicating a medium dense to very dense condition. The fill soils encountered within the existing baseball and softball fields are comprised of approximately 10 to 50 percent coarse-to-fine gravel, 20 to 50 percent coarse-to-fine sand, and 10 to 35 percent passing the #200 sieve. The fill soils have USCS classifications of SM and GM.

Underlying the fill soils, native soils were encountered to the termination depths of the borings. The native soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. A layer of silt with approximately 40 percent fine sand and 14 percent coarse gravel was observed between approximately 4 and 6 feet within boring SB-10. Field SPT N-values within the native soils ranged from 2 bpf to sampler refusal. When corrected, SPT N_{60}-values ranged from approximately 3 bpf to sampler refusal, indicating a very loose to very dense condition. Loose layers of native soils were observed between 10 to 15 feet, and 20 to 32 feet bgs within boring SB-9, between 4 and 8 feet, and 15 to 20 feet bgs within boring SB-10, and between 6 and 32 feet bgs within boring SB-11. Laboratory results of soil samples tested indicate that the native soils are comprised of approximately

14 to 39 percent coarse-to-fine gravel, 39 to 51 percent coarse-to-fine sand, and 7 to 47 percent passing the #200 sieve. The native soils have USCS classifications of SW-SM, SM, ML, and GM.

Infiltration tests INF-7 through INF-12 were advanced within the existing baseball and softball fields, for the proposed future stormwater management system. SPT sampling was not performed within the infiltration test holes.

As indicated on the boring logs, saturated soil conditions were encountered within borings SB-9 through SB-13 at varying depths. Groundwater was observed at a depth of 8 feet bgs within borings SB-9 and SB-10, and between 10 and 15 feet bgs within borings SB-11 through SB-13.

6.4 Pavement Borings

Borings PB-1 through PB-6 were advanced around the perimeter of the existing baseball field for the proposed pedestrian asphalt paths, and the proposed ADA parking lot to be constructed to the southeast of the baseball field. In general, the subsurface conditions consisted of pockets of fill soils, and native soils to the termination depths of the borings of up to 6 feet bgs.

Underlying a thin veneer of topsoil-like material, gravel, or the running track surface and asphalt, fill soils were observed to depths up to 6 feet bgs within borings PB-1 through PB-5. The fill soils generally consisted of variable-colored coarse-to-fine gravel, with varying amounts of coarse-to-fine sand and fines. Field SPT N-values within the fill soils ranged from 13 to 56 bpf. When corrected, SPT N_{60}-values ranged from approximately 17 to 73 bpf, indicating a medium dense to very dense condition. Laboratory results of soil samples tested indicate that the fill soils are comprised of approximately 21 to 49 percent coarse-to-fine gravel, 37 to 65 percent coarse-to-fine sand, and 12 to 14 percent passing the #200 sieve. The native soils have USCS classifications of GM.

Native soils were encountered below the fill soils within borings PB-2, PB-4, and PB-5, and below a thin veneer of topsoil-like material within boring PB-6. The native soils generally consisted of variable-colored coarse-to-fine sand and gravel, with varying amounts of fines. SPT N-values within the native soils ranged from 20 to 28 bpf. When corrected, SPT N_{60}-values ranged from 26 to 36 bpf, indicating a medium dense to dense condition. The native soils have USCS classifications of SM and GM.

As indicated on the boring logs, saturated soil conditions were not encountered within any of the pavement borings. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

7.0 INFILTRATION TESTS

Twelve (12) infiltration tests, designated as INF-1 through INF-12 were performed throughout the project site. In general, these tests found that the infiltration rates vary significantly throughout the site. The site soils within infiltration tests INF-1, INF-2, advanced within the northern portion of the multipurpose field, and INF-6, advanced within the landscape area to the southeast of the multipurpose field, had a relatively low infiltration rate, with measured rates between approximately 2 to 2.6 inches per hour (iph). The infiltration rates within the center and southern portion of the multipurpose field, and within the baseball and softball fields had relatively high infiltration rates, with measured rates ranging from approximately 13 to 24 iph. The stable infiltration rates are presented in the infiltration test logs, attached to Appendix I.

8.0 SEISMIC SITE COEFFICIENTS AND LIQUEFACTION POTENTIAL

Based on the results of the subsurface investigation and the criteria outlined in the current edition of the New York State Building Code (Code), the subsurface conditions underlying the site should be considered Class D, with maximum spectral response accelerations at short periods (S_{MS}) equal to 0.452g and at 1-second periods (S_{M1}) equal to 0.146g. Based on the procedures outlined in the Code, the corresponding five-percent damped design spectral response acceleration at short periods, S_{DS}, is equal to 0.301g, and at 1-second, S_{D1}, is equal to 0.098g. It should be noted that the values given above are the same, whether the structures to be built are essential or non-essential facilities.

Liquefaction of soils can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, granular soils saturated by a shallow groundwater table are most susceptible to liquefaction. Liquefaction occurs when an earthquake and associated ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid increase in pore-water pressure, causing the soil to behave as a fluid for short periods.

An analysis was performed to evaluate the liquefaction potential at the site, in accordance with the Code, using a procedure recommended by Youd et. al. (2001). This method estimates the stresses likely to be induced by an earthquake and the stresses likely to initiate liquefaction using the SPT N-values, the effective overburden pressure, and the peak horizontal ground acceleration caused by the design seismic event. The factors of safety against liquefaction were computed by the ratio of cyclic shear strength of the soil to the cyclic shear stress induced by the seismic event. Using a design earthquake magnitude of 5.47 and the peak horizontal ground acceleration of 0.176g, specified by the Code and reported by the USGS, the liquefaction analysis indicates that the subsurface soils have a factor of safety against liquefaction greater than the generally accepted minimum of 1.1. Subsequently, the soils underlying the site are unlikely to liquefy during the design earthquake.

9.0 DISCUSSION AND CONCLUSIONS

The proposed project consists of various site improvements throughout the athletic facility, including the installation of new stormwater management systems within the multipurpose, baseball, and softball fields, a new concession building with a second-floor press box, new bleachers, pedestrian walking paths, field lighting, and an ADA parking lot. Construction of the various site improvements are feasible from a geotechnical standpoint. The results of the subsurface investigation indicate that the site is generally underlain by fill soils, and native till, consisting of sand and gravel, with varying amounts of fines. The fill soils were generally observed in a medium dense to dense condition, and the native soils were generally in a medium dense condition, with isolated pockets of relatively deep loose native soils.

The proposed 1,800 sf concession building with a second-floor press box is proposed to be constructed to the west of the multipurpose field, adjacent to the existing bleachers. As of the writing of this report, structural loading values were not available, but based on the anticipated construction and use of the building, it is anticipated that the structure will impart relatively light loads. Borings SB-1 and SB-2 were advanced within the footprint of the proposed building. Within the borings, medium dense native soils were observed between 0 and 15 feet bgs. Loose native soils were observed between 15 and 30 feet bgs within boring SB-1, and between 15 and 20 feet bgs within boring SB-2. Due to the anticipated light loads of the building, our analysis indicates that the influence of the foundation loads will be minimal at the depth of the loose layers of soil. Therefore, the proposed building can be supported by traditional, shallow foundations. Significant re-grading in the footprint of the building is not anticipated; therefore, the proposed building is assumed to have an FFE of approximately +279 feet.

New field lighting structures are proposed to be constructed adjacent to the multipurpose, baseball, and softball fields. The subsurface conditions in the vicinity of the multipurpose field generally consists of medium dense to dense native sand and gravel soils. It should be noted that loose native soils were observed between 6 and 32 feet bgs within boring SB-11, advanced within the center of the softball field. Specifications regarding the field lighting structures were not available as of the writing of this report; however, based on our experience on similar projects, the preferred foundation for light poles are drilled shaft foundations, which can be designed to resist the large overturning moments typical of these structures.

New visitor bleachers are proposed to be constructed to the east of the multipurpose field. Borings SB-6, SB-7, and SB-7A were advanced within the vicinity of the proposed bleachers. The subsurface conditions generally consisted of loose to very dense native soils. A loose layer of native soil was observed between 0 and 2 feet bgs within boring SB-6. The bleachers are expected to be supported by shallow foundations, so it is anticipated that the loose upper layer will be excavated as part of the construction.

New dugouts are proposed to be constructed for the existing softball field, located in the northwest corner of the athletic facility. Based on the provided survey, there are existing dugouts for the baseball field, in the southwest corner of the facility that are constructed at grade. It is anticipated that the new dugouts will be constructed in the style of the baseball field dugouts. Based on documents provided by the Client Agent, the dugouts are proposed on slabs-on-grade. Based on the subsurface conditions observed, the dugout slabs can be supported either on the in-place fill soils, or on properly compacted structural fill. The footprints of the dugout slabs should be properly prepared and compacted per Section 11 prior to the placement of concrete to minimize potential settlement. Seasonal deformation of slabs bearing above the frost depth can be reduced by undercutting the frost susceptible soil subgrades and replacing them with gravel or other non-frost susceptible soils, as described in Section 11.

It is Tectonic's understanding that a new ADA parking lot will be constructed to the southwest of the multipurpose field, and pedestrian walkway will be constructed around the perimeter of the athletic facility. Based on documents provided by the Client Agent, the ADA parking lot is proposed to be constructed with flexible pavement for medium-duty traffic, for wheel loads up to 9,000 pounds. The pedestrian walkways are anticipated to be constructed for light-duty loading. The proposed new asphalt paving sections should be designed as discussed in Section 10.7. Due to the relatively high fines content of the native soils, frost heave susceptibility should be considered regarding longevity of the pavement.

Groundwater was observed at varying depths throughout the site. Within the footprint of the proposed concession building, groundwater was encountered at approximately 15 feet bgs; groundwater was observed between 8 and 10 feet bgs within the existing baseball and softball fields; groundwater was not encountered in the footprint of the proposed visitor bleachers, or within the footprints of the ADA parking lot and pedestrian walkways. It is not expected that groundwater will affect construction of the proposed concession building, bleachers, or dugouts, but perched groundwater will likely be encountered during construction throughout the sites. Depending on the final configuration of the proposed lighting structure foundations, groundwater may be encountered during construction of the drilled shaft foundations.

Due to relatively high fines content of the on-site soils, they should be considered to be sensitive to disturbance during excavation and/or compaction, when exposed to water. Therefore, it is critical that care be taken during construction of foundations and pavement subgrade preparation to prevent undue wetting of the soils. Due to the density and generally high fines content of the native till, it is expected to have relatively low permeability, and to be difficult to dewater. It should be noted that groundwater was observed throughout the site between 8 and 15 feet bgs, and may be encountered during the construction phase in a perched condition overlying the finer-grained soils. Grading of pavement subgrades to shed water and to prevent ponding will also be critical to prevent disturbance of the existing soils. Both of these conditions may require subgrade remediation during the construction of new structures and pavement sections, if adequate protection cannot be maintained. Subgrade disturbance can be minimized by using proper subgrade preparation techniques, as described in Section 11 of this report.

The following are other general conclusions that can be made regarding the proposed construction:

- Excavation should be feasible with conventional construction equipment; however, it should be noted that cobbles and boulders may be encountered during excavation.

- Due to their relatively high fines content, the soils found on-site are typically not suitable for use as structural fill. The existing fill and native soils should not be used as backfill behind foundation walls, because their high fines content will impede the proper drainage of the backfill. If used for general fill, these soils are moisture sensitive, and should be at or below optimum moisture content when placed and compacted, to achieve the specific degree of compaction and to provide a stable pavement subgrade. Construction delays should be expected, if the on-site soils are used.

- The results of our liquefaction analysis indicate that the soils underlying the site are unlikely to liquefy.

10.0 RECOMMENDATIONS

The following sections provide our geotechnical recommendations for design and construction of the proposed concession building, field lighting, bleachers, and asphalt paving. The recommendations are based on our understanding of the proposed construction, as described in Section 3, the results of our subsurface investigation and our experience in the general vicinity of the project site.

10.1 Concession and Press Box Building Foundations

The proposed concession and press box building can be supported on conventional shallow spread footings or continuous wall footings that bear on the medium dense to dense native soils. It should be noted that loose layers of native soil were observed between 15 and 32 feet within boring SB-1, and between 20 and 25 feet bgs within boring SB-2. If encountered during excavation, it is recommended that any soft and unsuitable soils encountered within the zone of influence of the building foundations are undercut, and replaced with properly compacted, structural fill.

Due to the dense nature of the soils at the anticipated bearing elevation, and the expected light loads for the building, our analysis indicates that the influence of the foundation loads will largely dissipate before reaching the depths of the loose layers. If any loose or unsuitable soils are encountered within the footprint of the concession building foundations, they should be removed from the zone of influence of the foundations, and replaced with compacted, structural fill. Spread and continuous wall footings for the new buildings and building additions bearing on medium dense native soils or compacted structural fill can be designed for a maximum net allowable soil bearing pressure of 2,000 pounds per square foot (psf). Section 11 of this report provides the subgrade preparation procedures necessary to achieve the recommended bearing capacity.

Using the above design criteria, total settlement of the proposed building is estimated to be up to 1 inch and differential settlements are estimated to be less than 0.5 inch. The differential settlement is estimated between columns and over a distance of about 30 feet along continuous footings. Continuous wall footings should have a minimum width of 2 feet and isolated spread footing should have a minimum width of 3.5 feet. All footings should bear at least 4 feet below the outside grade, for frost protection.

10.2 Concession and Press Box Slab-On-Grade Floors

Slab-on-grade floors should be supported on a minimum 6-inch-thick layer of free draining ½ to ¾ inch crushed stone placed over the existing in-place soils, or structural fill subgrades. If encountered, any loose fill that is encountered below the slab-on-grades should be removed and replaced with compacted structural fill prior to placement of crushed stone. All moisture-sensitive floor slabs should be constructed above a vapor barrier, consisting of a polyethylene membrane with a minimum thickness of twenty (20) mils. A coefficient of friction of 0.3 should be used between the slab and the vapor barrier. If concrete is cast directly against competent native soils, structural fill or existing fill, a coefficient of friction of 0.4 can be used.

A subgrade modulus of 150 pounds per cubic inch (pci) is recommended for design of slab-on-grade floors bearing on 6 inches of crushed stone base placed above the existing fill. The design should be in accordance with the latest edition of the American Concrete Institute (ACI 360). The subgrade modulus is suitable for estimating distributions of bearing pressure beneath the slab and for estimating bending moments and shears within the slab. It is not intended for calculating total or differential settlements.

10.3 Dugout Slabs

The dugout can be supported by a slab-on-grade assuming frost heave can be tolerated. Slabs for the proposed dugouts should be supported on a minimum 6-inch-thick layer of free draining ½ to ¾ inch crushed stone placed over the existing in-place soil, or structural fill subgrades. If encountered, any loose fill that is encountered below the slab-on-grades should be removed and replaced with compacted structural fill prior to placement of crushed stone. If concrete is cast directly against competent native soils, structural fill or existing fill, a coefficient of friction of 0.4 can be used. A subgrade modulus of 150 pounds per cubic inch (pci) is recommended for design of slab-on-grade floors bearing on 6 inches of crushed stone base placed above the existing fill. The design should be in accordance with the latest edition of the American Concrete Institute (ACI 360). The subgrade modulus is suitable for estimating distributions of bearing pressure beneath the slab and for estimating bending moments and shears within the slab. It is not intended for calculating total or differential settlements.

10.4 Design for Lateral Loading of Walls

Any foundation walls and temporary shoring should be designed in accordance with the following criteria:

Table 10.4.1 – Lateral Load Parameters		
Soil Parameter	On-Site Soil	Structural Fill
Angle of Internal Friction	32°	34°
Active Earth Pressure Coefficient (K_a) [1]	0.31	0.28
Passive Earth Pressure Coefficient (K_p) [2]	3.25	3.54
At-Rest Earth Pressure Coefficient (K_o) [3]	0.47	0.44
Unit Weight of Soil (pounds per cubic foot)	115	125
Coefficient of Base Friction	0.4	0.4

1) Use for freestanding walls, such as retaining walls, where movement of up to 0.0015 X height of wall is both possible and tolerable. Otherwise, use at-rest coefficient.

2) Reduce passive pressure by half above a depth of 4 feet below exterior grade to account for disturbance caused by frost action.

3) Use for walls restrained against outward lateral movement, such as foundation walls.

Additional loading due to temporary and permanent surcharges should be added to the lateral loading exerted by the retained soil. Loads due to supported structures should be applied in appropriate combinations with the lateral loads. Walls should be backfilled in accordance with Section 11.3 of this report. Placement and compaction of backfill should be observed and tested by a geotechnical engineer to monitor that proper compaction is being achieved.

10.5 Athletic Field Lighting Foundations

The proposed athletic field lighting structures can be supported on drilled shafts. Design for axial compressive loading can incorporate both end bearing and side resistance, while design for uplift load should only incorporate the side resistance and the pile weight. Drilled shaft foundations should bear at a minimum depth of 8 feet below proposed grade, or 3 times the shaft diameter, whichever is greater. The diameter and embedment depth of the proposed shafts are not known to Tectonic as of the writing of this report. Design parameters for drilled shaft foundations to be constructed adjacent to the multipurpose field to resist axial loading are provided in Table 10.5.1. Design parameters for drilled shaft foundations constructed

adjacent to the baseball/softball fields to resist axial loading are provided in Table 10.5.2. A design groundwater depth of 12 feet bgs should be used for the lighting structures constructed adjacent to the multipurpose field, and a design groundwater depth of 8 feet bgs should be used for lighting structures constructed adjacent to the baseball and softball fields.

Table 10.5.1 – Drilled Pier Design Parameters for Axial Loading (Multipurpose Field Lighting)		
Depth Interval below Existing Grade (feet)	Drilled Pier Parameters	
	Allowable Skin Friction (psf)	Allowable End Bearing Pressure (ksf)
0 – 4	0 – 80	N/A
4 – 8	175 – 320	N/A
8 – 15	320 – 525	6
15 – 32	525 – 630	6

Table 10.5.2 – Drilled Pier Design Parameters for Axial Loading (Baseball/Softball Field Lighting)		
Depth Interval below Existing Grade (feet)	Drilled Pier Parameters	
	Allowable Skin Friction (psf)	Allowable End Bearing Pressure (ksf)
0 – 4	0 – 80	N/A
4 – 8	165 – 300	N/A
8 – 15	300 – 375	4
15 – 32	375 – 500	6

Notes:
1. Skin friction varies linearly with depth and can be interpolated for piles terminated within a given depth interval.
2. Allowable side resistance has been reduced by half in the upper 4 feet to account for frost.
3. Allowable resistance based on a factor of safety of 2.
4. The range given for allowable end bearing pressure corresponds to the top and bottom of the depth interval, and values for intermediate depths can be linearly interpolated.
5. The pile weight should be included in the uplift capacity.

It is anticipated that the primary lateral loading on the lighting structures will be from wind loads. The soil parameters presented in Table 10.5.3 below are provided for design to resist lateral movement and for analyzing lateral deflection and lateral stability of shafts constructed adjacent to the multipurpose field. The parameters presented in Table 10.5.4 are provided for design of shafts constructed adjacent

to the baseball and softball fields. Lateral deflection at the top of the shaft should be checked using a computer program such as LPILE.

Table 10.5.3 – Lateral Load Design Parameters (Multipurpose Field Lighting)								
Soil Type	Depth Below Proposed Ground (ft)		γ'	c	ϕ'	K static	K_p	e_{50}
	From	To	(pcf)	(psf)	(deg)	(pci)		(in/in)
Upper Medium Dense to Dense Soils	0	10	115	0	34	90	1.77/ 3.54(1)	NA
Medium Dense Native Sand Soils	10	32	115/47.6 (2)	0	32	90/60 (2)	3.54	NA

Table 10.5.4 – Lateral Load Design Parameters (Baseball/Softball Field Lighting)								
Soil Type	Depth Below Proposed Ground (ft)		γ'	c	ϕ'	K static	K_p	e_{50}
	From	To	(pcf)	(psf)	(deg)	(pci)		(in/in)
Upper Medium Dense to Dense Soils	0	8	115	0	34	90	1.77/ 3.54(1)	NA
Loose to Medium Dense Native Soils	8	25	42.6	0	30	20	3.00	NA
Medium Dense to Dense Native Soils	25	32	52.6	0	34	60	3.54	NA

Where

γ' = Effective unit weight
c = Cohesion
φ' = Effective friction angle
Kstatic = LPILE soil modulus parameter
K_p = Passive earth pressure coefficient
e_{50} = Strain at 50 percent
NA = Not Applicable

Note:

1. The static passive resistances (Kp) within the top 4 feet of the piles have been cut by half to accommodate weakening from frost action.
2. The upper value is for soils above the water table and the lower value is for soils below the water table, which is assumed to be at a depth of 15 feet in the area of the multipurpose fields.

10.6 Groundwater and Foundation Drainage

Based on the results of our subsurface investigation, it is not anticipated that groundwater will affect the construction of the foundations of the concession building foundations, pavement sections, and bleachers, but may for the lighting structures. In addition, perched groundwater may be encountered during the construction phase. Rainwater and surface water may become trapped in excavations. If necessary, dewatering can be performed with sump pumps and should be performed to allow work to be performed in the dry. Any dewatering should prevent loosening or migration of the subgrade soils. The dewatering system, if necessary, should be designed by a New York State licensed Professional Engineer.

Grading of the surface of the backfill and the surrounding topography and pavements should provide positive drainage away from the walls. Roof drains should be positively drained to areas away from the building.

10.7 Bleacher Foundations

Bleachers are proposed to be constructed to the east of the existing multipurpose field. The upper soils within the athletic field generally consist of medium dense to dense sand and gravel soils. If encountered, loose soils in the zone of influence of the bleacher foundations should be removed, and replaced with compacted, granular fill. The proposed bleachers may be supported on shallow foundations that bear on the existing in-place soils at a minimum depth of 4 feet for protection from frost. Bleacher foundations can be designed for a maximum net allowable soil bearing pressure of 2,000 psf. Total settlements of up to 1/2 inch and differential settlements of up to 1/4 inch can be expected. Section 11 of this report provides the subgrade preparation procedures necessary to achieve the recommended bearing capacity.

10.8 Pavements

It is our understanding that the proposed site improvements include the construction of new asphalt paving sections for the proposed ADA parking lot, and pedestrian walkways. It is our understanding that no significant re-grading of the site will be performed to construct the pavement sections. Subgrade preparation and proofrolling should be performed in accordance with the recommendations provided in Section 11 of this report. For this report, the pavement design parameters were estimated by Tectonic, for medium duty traffic. The standard duty section was based upon a daily traffic of 200 vehicles, with 25 percent heavy trucks. An assumed twenty (20) year design life was used for each pavement section.

Light duty pavement sections may be used for the pedestrian walking paths, where vehicle traffic is not anticipated.

A design California Bearing Ratio (CBR) value of 5 was selected for the design of the asphalt pavement section. This CBR was selected based on the soils encountered on the site, and the compacted native soils that will support the pavement.

Based on the generally high fines content of the subgrade soils, and the high susceptibility of these soils to frost heave, the subgrade should be undercut by 1 foot, and a separation fabric (Mirafi® 180N or similar) should be placed between the in-place soils and a 1-foot layer of non-expansive granular structural fill for frost heave protection. We recommend that the pavement section consist of the following:

Table 10.8.1 - Asphalt Pavements	
Pavement Section Type	Recommended Section
Light Duty	1.5 inches Top Course HMA (Items 402.095102 or 402.125102) 4 inches Type 2 Aggregate Subbase (Item 304.12) 12 inches Select Granular Fill (Item 203.07)
Medium Duty	2 inches Top Course HMA (Items 402.095102 or 402.125102) 3 inches Binder Course HMA (Item 402.195102 or 402.255902) 6 inches Type 2 Aggregate Subbase (Item 304.12) 12 inches Select Granular Fill (Item 203.07)

Note:

1) All Item Numbers are indicated in New York State Department of Transportation Standard Specifications.

11.0 EARTHWORK CONSTRUCTION CRITERIA

The following sections present our recommendations regarding earthwork and construction monitoring.

11.1 General Site Preparation

Initially, the site of the proposed building, bleachers, lighting structures, and pavement sections should be cleared and grubbed, then stripped of all existing fill, pavement, topsoil and debris. The clearing and grubbing should extend at least 5 feet beyond the planned structures to be constructed. Any existing asphalt pavement within the footprints of the ADA parking lot and pedestrian walkway should be stripped

and removed. Debris and vegetation from the clearing operations should be removed from the site and disposed of at a legal disposal facility. All soft or unsuitable materials and subsurface obstructions should be removed from the building footprint and the zone of influence of the slab-on-grade or foundation. The zone of influence is defined by 1:1 (horizontal to vertical) planes sloping downward and outward from the bottom edges of the slab or footing.

Any existing utilities within the project limits should be re-routed around the foundations or removed. The resulting excavations should be backfilled with structural fill in accordance with the procedures outlined below. Any trench excavations should be properly benched to allow for adequate compaction.

11.2 Subgrade Preparation

All building and bleacher foundation, slab-on-grade, and pavement subgrades should be inspected by the geotechnical engineer prior to the placement of structural fill, concrete, or pavement subbase material. It is our understanding that significant re-grading will not be performed for the construction of the proposed concession building, bleachers, dugouts, or asphalt paving sections. Any cut areas of the site should be lowered to the planned subgrade depth, and the exposed native soils should be proofrolled to observe for potentially yielding soils. In any proposed fill areas, the surface should be cleared and grubbed, and the resulting subgrade prior to fill placement should also be proofrolled. Areas to receive structural fill should also be proofrolled before placing any backfill materials.

The foundation and pavement subgrades, and any surfaces to receive structural fill or concrete should be proofrolled under the observation of the geotechnical engineer. Proofrolling should be accomplished by making a minimum of four (4) passes in perpendicular directions with a 10-ton roller in open areas, or a 1.5-ton trench roller, where access is confined. Proofrolling should not be performed on saturated soils or in areas having freestanding surface water, until they are dewatered and allowed to dry. Proofrolling soils that exceed the optimum moisture content may disturb the soils, resulting in more unfavorable conditions. Unsuitable materials or areas identified to be soft by the geotechnical engineer, based on visual inspection and observation of proofrolling operations should be removed and replaced with compacted structural fill. Any subgrade soils found to be soft and yielding during proofrolling, or otherwise deemed unsuitable by the geotechnical engineer, should be removed and replaced with properly compacted structural fill.

11.3 Fill and Backfill Materials

Imported structural fill should be well-graded granular soil that meets the general gradation requirements for New York State Department of Transportation (NYSDOT) Type 2 Aggregate Subbase (Item 304.12), and as follows:

Sieve Size	Percent Finer by Weight
2 Inch	100
¼ Inch	25 to 60
No. 40	5 to 40
No. 200	0 to 10

Based on the results of our subsurface investigation and laboratory testing the native soils are not suitable for use as structural fill, due to the high fines content (up to 47 percent). Any soils that are to be used as structural fill should be tested and approved by the geotechnical engineer prior to use.

Non-conforming native soils may be suitable for use as general fill in landscaped areas, provided they are free of trash, debris, roots, vegetation, or other deleterious materials. It should be noted that use of soils containing moderately high silt contents (such as those encountered at the site) will likely cause construction delays during the winter months, following periods of wet weather, or if the material is wet when excavated.

All general fill and structural fill should be compacted to at least 95 percent of the maximum dry density, at near optimum moisture contents, as determined by the modified Proctor test (ASTM D1557). The degree of compaction should be tested and documented by a geotechnical engineer for each lift of fill. The lift thickness for the structural fill soils will vary depending on the type of compaction equipment used. Structural fill should generally be placed in uniform horizontal lifts not exceeding 8 inches in loose thickness when using a 10-ton roller. In confined areas, the loose lift thickness should be 4 inches or less and each lift should be compacted with sufficient passes of hand operated vibratory or impact compaction equipment. A geotechnical engineer with appropriate field and laboratory support should inspect all subgrades, approve materials for use as fill, and test backfill materials for compliance with the recommended compaction.

Free draining crushed stone placed below floor slabs and as drainage materials behind foundation walls should be Underdrain Filter Type I materials (Item No. 733.2001) as specified in the NYSDOT Standard Specifications and as follows:

Sieve Size	Percent Finer by Weight
1 inch	100
1/2 inch	30 - 100
1/4 inch	0 - 30
No. 4	0 - 10
No. 8	0 – 5

Select granular fill to be placed below the subbase material for the asphalt paving sections should be a well-graded durable granular material that meets the gradation requirements for Select Granular Fill (Item 203.07).

11.4 Protection of Subgrades and Construction Dewatering

Approved soil subgrades should be protected from the effects of frost, construction traffic, perched groundwater, surface water and precipitation. The necessary protection should be provided as soon after approval by the geotechnical engineer as is practicable and should be maintained until coverage with compacted fill or gravel. It is recommended that temporary surface drainage measures be installed to divert runoff away from the proposed construction limits.

Based on the conditions observed during the subsurface investigation, perched groundwater may be encountered during the construction phase. If necessary, dewatering should be performed in a manner that will prevent loosening or migration of the subgrade soils and performed to maintain the water level at least 1 foot below the deepest excavation. Given the dense nature and high fines content of the on-site soils, it is anticipated that sump pits and pumps may be suitable for dewatering. Sump pits should be placed at least 1 foot outside of excavations for every foot below the subgrade elevation that they are excavated. The dewatering system should be designed by a New York State Licensed Professional Engineer, and it should be designed to ensure that dewatering does not result in any loss of soil.

As has been previously noted, the on-site soils contain a high percentage of fines and they will soften and experience a reduction in load-carrying capacity when exposed to moisture and disturbed. They may also become unworkable if allowed to get wet. These soils are also frost susceptible and could become disturbed if allowed to freeze during construction. Additional excavation and material removal may be required if subgrades are allowed to be exposed for long durations without fill or concrete placement. Additionally, construction traffic could also disturb the native soils.

If maintaining subgrade stabilization during periods of wet weather is a concern, crushed stone may be placed on footing and/or floor subgrades after excavation and proofrolling. The crushed stone should be clean ½ to ¾ inch gravel, stone, or recycled concrete, and should not exceed 6 inches in thickness.

11.5 Excavations and Shoring

Temporary excavation slopes should conform to the latest OSHA standards, including slopes permitted for specified heights and soil conditions encountered. The presence of perched water, or other deleterious materials could require flatter slopes or temporary excavation support (e.g., shoring and bracing). Excavation support may also be necessary in areas where sufficient distance to provide adequate benching of slopes is not available.

Excavations into the existing fill and native soil should be feasible using standard construction equipment (i.e. hydraulic excavator). Cobbles and boulders should be expected within both the existing fill and within the undisturbed glacial till. Design of dewatering and excavation support should conform to the latest OSHA and other applicable agency requirements. Design of all excavation slopes greater than a 4-foot depth and design of sheeting, shoring, and bracing should be performed by a New York State licensed Professional Engineer. Adequate dewatering or surface-water runoff control should be provided to avoid instability and caving of soils.

11.6 Deep Foundation Construction Considerations

Drilled shaft foundations should be constructed in accordance with the most recent standards of the International Association of Foundation Drilling (ADSC), the Code, and ACI 336. Plans and specifications should clearly indicate that variable soil conditions are present, and obstructions, likely in the form of cobbles and boulders, are present in the native soils. This will allow the contractor to employ the appropriate equipment and construction methodologies. The foundations should also be constructed under the full-time observation of the geotechnical engineer.

Due to the granular nature of the subsurface soils, a temporary steel casing may be needed to prevent collapse of the soils into the excavations, and drilling slurry may be required to maintain the sidewall stability below the groundwater level. At the time of the subsurface investigation, groundwater was observed at approximately 15 feet bgs adjacent to the multipurpose field, and between 8 and 10 feet bgs adjacent to the baseball fields. The embedment depth of the shafts is not known as of the writing

of this report, so groundwater may potentially be encountered when installing the shafts. The temporary casing could be extended to the full depth of the pile in lieu of the drilling slurry, provided that the casing is removed while concrete is placed. Removal of the casing should be performed so that the level of the concrete within the casing is always at least 1-foot above the bottom of the casing.

Concrete placement associated with the drilled piles should be performed utilizing a concrete pump and using tremie methods to prevent segregation of the concrete. If casing is used, concrete placement should be done in a manner to prevent "necking" of the drilled pile.

12.0 CONSTRUCTION MONITORING

A geotechnical engineer familiar with the existing subsurface conditions and having the appropriate laboratory and field-testing support should be engaged by the Client to observe that all earthwork is performed in accordance with the specifications, the Code, and the criteria provided in this report. As a minimum, the following work should be performed under the observation of the geotechnical engineer:

- Subgrade preparation
- Proofrolling
- Remedial removals of unsuitable soils
- Placement and compaction of fill and backfill materials
- Construction of drilled shafts for lighting structures
- Dewatering, if necessary

All materials proposed for use as soil fill should be tested and approved prior to delivery to the site. Additionally, all fill materials should be tested as they are being placed to verify that the required compaction is achieved. We further recommend that Tectonic be retained to review the project plans and specifications prior to completion of the bid documents.

13.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report. The recommendations contained in this report are intended for design purposes

only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the soil and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of The LA Group, for the specific application to the proposed construction detailed in this report. We recommend that prior to construction; Tectonic Engineering Consultants, Geologists, and Land Surveyors D.P.C. reviews the project plans and specifications. It should be noted that upon review of those documents, some recommendations presented herein might be revised or modified. In the event that any changes in the design or location of the proposed structures are planned, Tectonic shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

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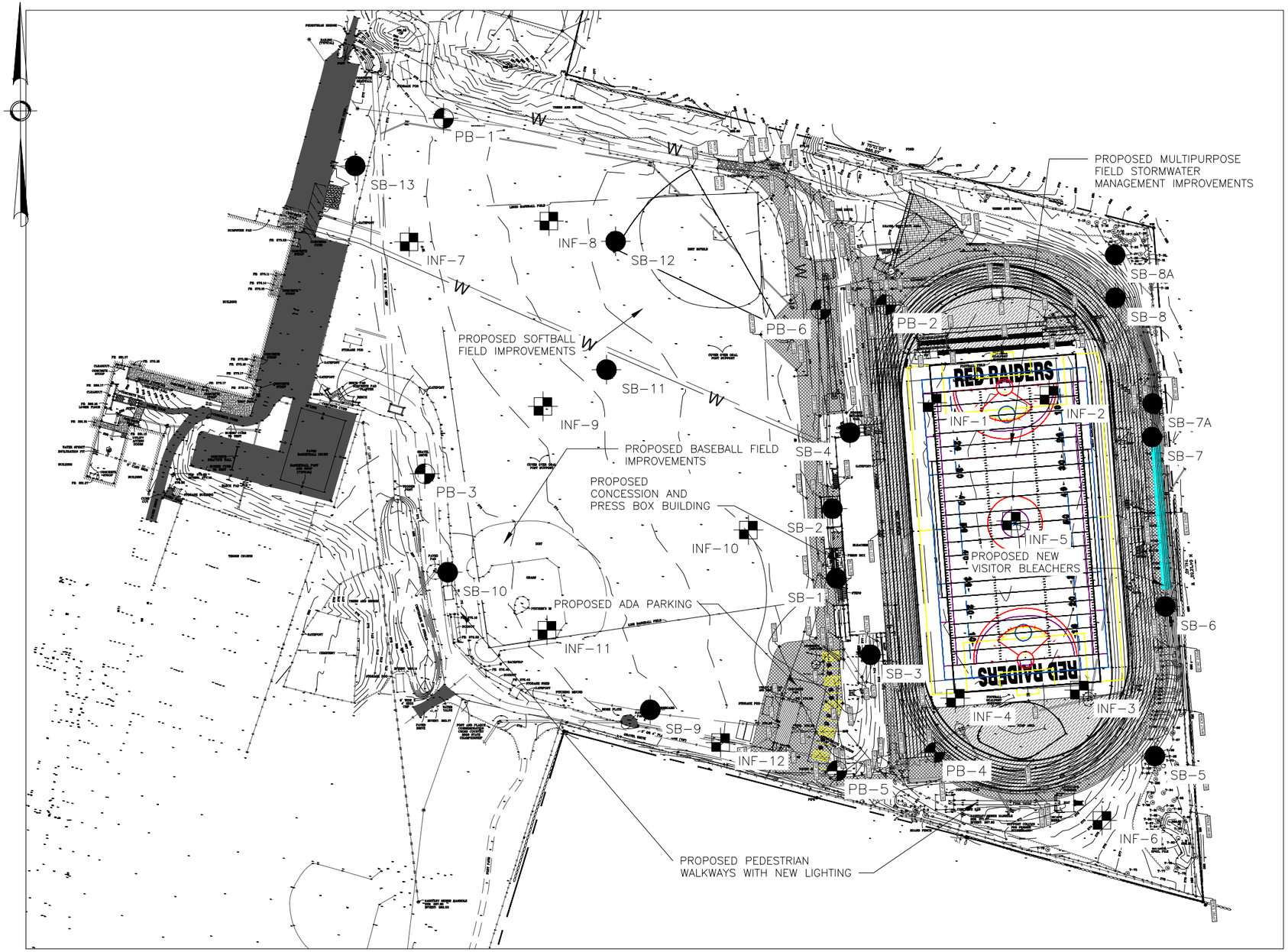
FIGURE I



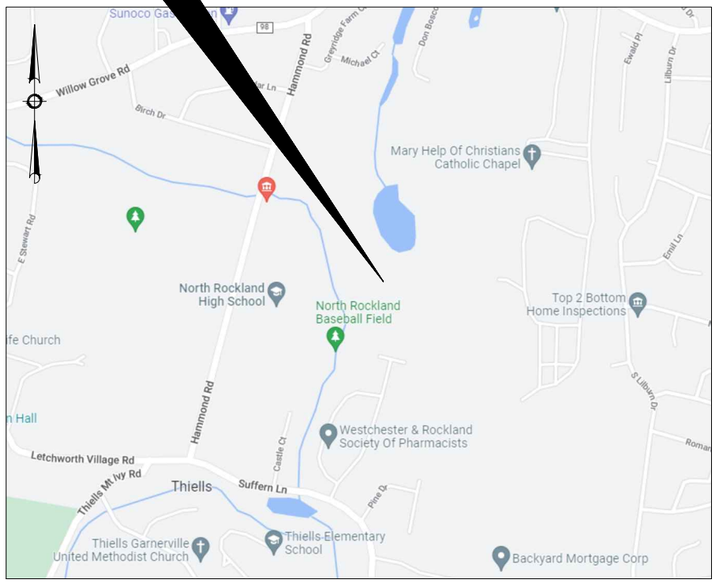
LEGEND

- PB-6 — APPROXIMATE PAVEMENT BORING LOCATION
- SB-13 — APPROXIMATE STRUCTURAL BORING LOCATION
- INF-12 — APPROXIMATE INFILTRATION TEST LOCATION

NOTES

1. PLAN BASED ON A SITE SURVEY PROVIDED BY THE LA GROUP DATED 05/2022.
2. BORINGS AND INFILTRATION TEST LOCATIONS WERE FIELD LOCATED BY TECTONIC AND SHOULD BE CONSIDERED APPROXIMATE.

SITE



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ORIGINAL SIZE IN INCHES

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.
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BORING AND INFILTRATION TEST LOCATION PLAN

PROPOSED ATHLETIC FACILITY IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NY

Date	Work Order	Drawing No.	Rev
10/13/2022	11584.01	FIGURE I	0
Scale 1" = 125'			

APPENDIX I

Tectonic

BORING No. PB-1

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **274.5**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ 1 2 3 4 5
PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50
● STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	24	4, 9, 15, 13	S-1	16		M	SW-SM	1" Topsoil-like material Bwn c-f SAND, and f Gravel, little Silt (FILL)		
3	43	21, 21, 22, 22	S-2	11		M	SM	Bwn-gy c-f SAND, some c-f Gravel, little Silt (FILL)		
5	24	12, 14, 10, 16	S-3	22		M	SM	Same (FILL)		269.5
7								End of Boring at 6'		
10										264.5
15										259.5
20										254.5
25										249.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. PB-2

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	14	15 6 8 17	S-1	15		M	GM	Red track surface, 2" asphalt, 3" subbase gravel Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)		
3	56	21 31 25 21	S-2	19		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
5	28	16 14 14 11	S-3	10		M	SM	Bwn-gy c-f SAND, and c-f Gravel, little Silt		267.0
6								End of Boring at 6'		
10										262.0
15										257.0
20										252.0
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-3

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **271.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	50	13 17 33 36	S-1	16		M	GM	4" gravel surface Bwn c-f GRAVEL, and m-f Sand, little Silt (FILL)		
3	55	21 30 25 26	S-2	17		M	GM	Gy-bwn c-f GRAVEL, some c-f Sand, little Silt (FILL)		
5	30	14 16 14 11	S-3	9		M	GM	Same (FILL)		266.0
7								End of Boring at 6'		
10										261.0
15										256.0
20										251.0
25										246.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-4

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	13	10 5 8 9	S-1	13		M	SM	Red track surface, 1" asphalt, 3" subbase gravel Bwn c-f SAND, some f Gravel, little Silt (FILL)		
3	18	12 7 11 15	S-2	18		M	SM	Bwn c-f SAND, some c-f Gravel, little Silt		
5	21	19 13 8 6	S-3	19		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel		267.0
6								End of Boring at 6'		
10										262.0
15										257.0
20										252.0
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-5

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **276.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	40	14, 19, 21, 12	S-1	12		M	GM	3" gravel surface Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
3–4	21	8, 13, 8, 6	S-2	10		M	SM	Bwn-tn c-f SAND, little f Gravel, little Silt		
5–6	20	10, 10, 10, 12	S-3	19		M	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		271.0
								End of Boring at 6'		
10										266.0
15										261.0
20										256.0
25										251.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. PB-6

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Geoprobe 7822DT track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Billy Johnson**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **8/9/22**
DATE FINISH: **8/9/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	27	11 16 11 15	S-1	16		M	SM	3" topsoil-like material Bwn c-f SAND, and c-f Gravel, little Silt (FILL)		
3	38	15 21 17 15	S-2	11		M	SM	Same (FILL)		
5	28	14 14 14 12	S-3	16		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt		273.0
6								End of Boring at 6'		
10										268.0
15										263.0
20										258.0
25										253.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-1

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **40'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	18	5, 7, 11, 15	S-1	20		M	SM	3" gravel surface Bwn-gy c-f SAND, some c-f Gravel, little Silt (FILL)		
3–4	35	20, 18, 17, 11	S-2	20		M	GW-GM	Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)		
5–6	16	11, 10, 6, 9	S-3	10		M	GW-GM	Same (FILL)		274.0
7–8	23	10, 12, 11, 9	S-4	9		M	SM	Bwn-gy c-f SAND, some c-f Gravel, little Silt		
9–10	14	8, 8, 6, 6	S-5	19		M	SM	Bwn c-f SAND, some c-f Gravel, little Silt		269.0
11–12	10	5, 6, 4, 5	S-6	18		M	SM	Bwn c-f SAND, little Silt, trace c-f Gravel		
13–14										
15–16	6	3, 3, 3, 3	S-7	18		W	SM	Bwn c-f SAND, little Silt, trace c-f Gravel		264.0
17–18										
19–20										259.0
21–22	8	WOR, 4, 4, 4	S-8	21		W	SM	Same		
23–24										
25										254.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-1

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	1	WOH 0 1 1	S-9	10		W	SM	Bwn-gy c-f SAND, and Silt		
27										
28										
29										
30										249.0
31	8	2 4 4 3	S-10	18		W	SM	Gy m-f SAND, and Silt		
32										
33										
34										
35										244.0
36	9	1 3 6 9	S-11	16		W	ML	Gy-rd SILT, some m-f Sand, some c-f Gravel		
37										
38										
39										
40										239.0
41	33	8 15 18 16	S-12	16		W	ML	Rd-gy SILT, some c-f Gravel, some c-f Sand		
42										
43								End of Boring at 42'		
44										
45										234.0
46										
47										
48										
49										
50										229.0
51										
52										
53										
54										
55										224.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-2

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **25'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	8	8 4 4 5	S-1	14		M	SM	3" gravel surface Bwn-gy c-f SAND, some c-f Gravel, little Silt (FILL)		
3	15	4 6 9 10	S-2	9		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
5	33	15 15 18 11	S-3	18		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, some Silt (FILL)		274.0
7	12	8 7 5 10	S-4	16		M	SM	Bwn-gy c-f SAND, some c-f Gravel, some Silt		
9	22	12 12 10 7	S-5	14		M	SM	Same		
10										269.0
11	15	8 8 7 7	S-6	14		M	SM	Same		
15										264.0
16	10	4 5 5 5	S-7	8		W	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		
20										259.0
21	5	3 3 2 2	S-8	22		W	SM	Bwn-gy m-f SAND, some Silt, trace c-f Gravel		
25										254.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-2

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	20	12 10 10 9	S-9	24		W	SM	Bwn c-f SAND, and c-f Gravel, little Silt		
27										
28								End of Boring at 27'		
30										249.0
35										244.0
40										239.0
45										234.0
50										229.0
55										224.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-3

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **65° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **9/15/22**
DATE FINISH: **9/15/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	11	4 6 5 5	S-1	10		M	GM	3" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)	
3	28	6 11 17 16	S-2	16		M	GM	Same (FILL)	
5	14	13 8 6 4	S-3A S-3B	18		M	SM ML	8" Bwn c-f SAND, some c-f Gravel, little Silt (FILL) 10" Or-bwn SILT, some m-f Sand, trace c-f Gravel	273.0
7	34	11 14 20 18	S-4	20		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt	
9	72	17 24 48 37	S-5	18		M	GM	Bwn-gy c-f GRAVEL, some m-f Sand, little Silt	
10	50+	50/3	S-6	3		M	SM	Gy-wht c-f SAND, little c-f Gravel, little Silt	268.0
15									263.0
16	14	8 8 6 3	S-7	16		W	SM	Bwn c-f SAND, little Silt, trace c-f Gravel	
20									258.0
21	15	4 7 8 6	S-8	18		W	SM	Bwn-or c-f SAND, some Silt, trace c-f Gravel	
25									253.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-3

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	4	2 2 2 2	S-9	14		W	SM	Tn-or c-f SAND, and Silt		
27										
28										
29										
30										248.0
31	3	2 0 3 2	S-10	20		W	ML	Gy-or SILT, and m-f Sand		
32										
33								End of Boring at 32'		
34										
35										243.0
36										
37										
38										
39										
40										238.0
41										
42										
43										
44										
45										233.0
46										
47										
48										
49										
50										228.0
51										
52										
53										
54										
55										223.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-4

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **276.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	23	4, 10, 13, 16	S-1	8		M	GM	4" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
3–4	32	22, 22, 10, 12	S-2	8		M	SM	Bwn c-f SAND, some Silt, little c-f Gravel		
5–6	24	6, 11, 13, 10	S-3	18		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt		271.0
7–8	24	11, 10, 14, 11	S-4	17		M	SM	Bwn-gy c-f SAND, some c-f Gravel, little Silt		
9–10	28	11, 12, 16, 12	S-5	17		M	SM	Same		266.0
11–12	13	8, 8, 5, 7	S-6	20		M	SM	Tn m-f SAND, some Silt		
13–14										
15–16	9	4, 4, 5, 22	S-7	18		W	SM	Bwn c-f SAND, little Silt, trace f Gravel		261.0
17–18										
19–20										256.0
21–22	10	2, 5, 5, 5	S-8	24		W	SM	Gy m-f SAND, little Silt		
23–24										
25										251.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-4

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

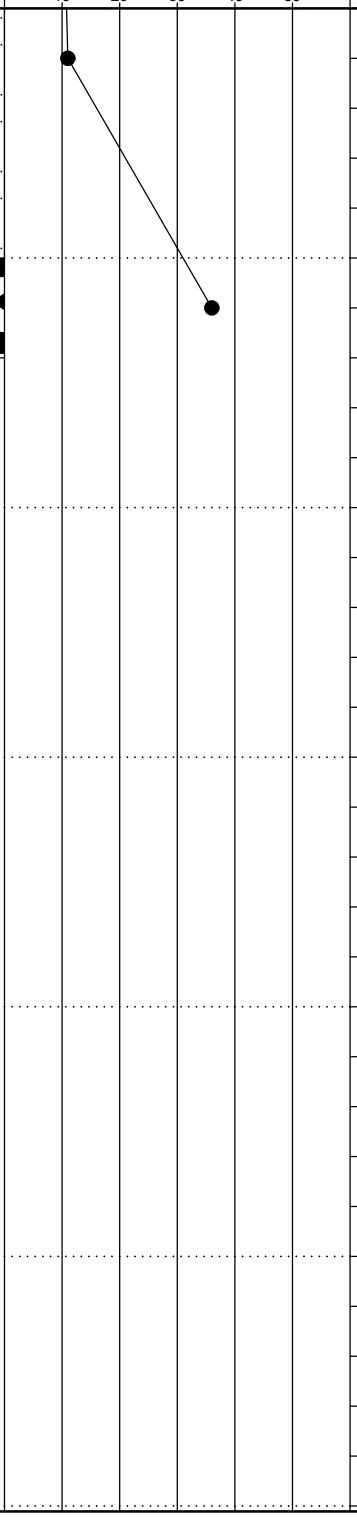
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	11	3 5 6 7	S-9	14		W	SM	Bwn m-f SAND, and Silt		
27										
28										
29										
30										246.0
31	36	24 13 23 14	S-10	12		W	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt		
32										
33								End of Boring at 32'		
34										
35										241.0
36										
37										
38										
39										
40										236.0
41										
42										
43										
44										
45										231.0
46										
47										
48										
49										
50										226.0
51										
52										
53										
54										
55										221.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50



REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-5

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **15'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	11	1 3 8 10	S-1	16		M	SM	6" topsoil-like material Bwn c-f SAND, some Silt, little c-f Gravel (FILL)		
3	29	8 15 14 9	S-2	17		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel		
5	28	6 18 10 7	S-3	14		M	GM	Bwn c-f GRAVEL, some c-f Sand, some Silt		273.0
7	14	8 8 6 6	S-4	20		M	SM	Bwn m-f SAND, and Silt, little f Gravel		
9	14	8 8 6 9	S-5	12		M	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		268.0
11	39	22 16 23 28	S-6	24		M	GM	Bwn c-f GRAVEL, some c-f Sand, some Silt		
15	50+	63 50/2	S-7	8		M	GM	Bwn c-f GRAVEL, little c-f Sand, little Silt Auger refusal at 16 feet bgs		263.0
								End of Boring at 16'		
										258.0
										253.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-6

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **20'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	6	1 3 3 4	S-1	15		M	SM	3" topsoil-like material Bwn c-f SAND, some c-f Gravel, little Silt (FILL)		
3	14	6 6 8 7	S-2	6		M	GM	Bwn-gy c-f GRAVEL, little c-f Sand, little Silt (FILL)		
5	13	12 8 5 5	S-3	16		M	SM	Bwn-gy c-f SAND, and c-f Gravel, some Silt		274.0
7	21	21 17 4 3	S-4	18		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel		
9	27	8 12 15 8	S-5	10		M	GM	Bwn-gy c-f GRAVEL, some Silt, some c-f Sand		269.0
11	27	3 11 16 16	S-6	10		M	ML	Bwn SILT, some c-f Sand, little c-f Gravel		
13										
15										264.0
16	40	7 19 21 33	S-7	20		M	ML	Bwn-gy SILT, some c-f Gravel, little c-f Sand		
18										
20	50+	50/0	S-8					No recovery in spoon Auger refusal at 20 feet bgs		259.0
21								End of Boring at 20'		
22										
23										
24										
25										254.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-7

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **4'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

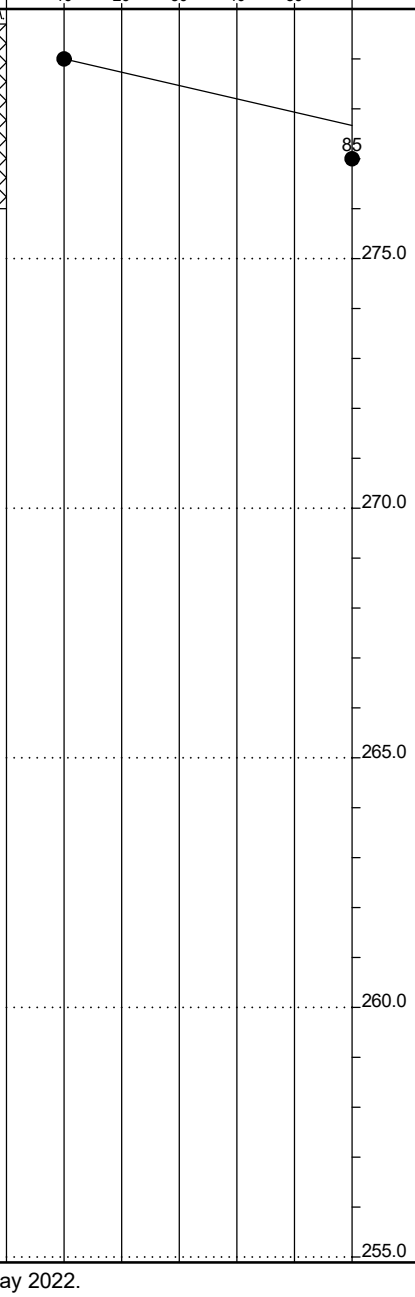
GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	10	3 5 5 5	S-1	8		M	GM	3" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
2										
3	85+	29 35 50/2	S-2	9		M	GM	Same (FILL) Auger refusal at 4 feet bgs See Boring SB-7A		
4										
5								End of Boring at 4'		275.0
6										
7										
8										
9										
10										270.0
11										
12										
13										
14										
15										265.0
16										
17										
18										
19										
20										260.0
21										
22										
23										
24										
25										255.0



REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-7A

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **20'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **80° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **9/12/22**
DATE FINISH: **9/12/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–4								Boring SB-7A offset 3 feet north of boring B-7. No SPT sampling performed to 4 feet bgs		
5–6	47	24 26 21 17	S-1	24		M	SM	Bwn m-f SAND, some Silt, some c-f Gravel		275.0
7–8	24	12 12 12 10	S-2	18		M	SM	Same		
9–10	27	15 16 11 10	S-3	14		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt		270.0
11–12	28	28 16 12 12	S-4	9		M	GM	Bwn-blk-gy c-f GRAVEL, and Silt, little c-f Sand		
13–15										265.0
16	50+	50 50/2	S-5	4		M	GM	Gy-bwn c-f GRAVEL, little Silt, trace c-f Sand		
17–20										260.0
20	50+	50/0	S-6	0				No recovery in spoon Auger refusal at 20 feet bgs		
21–25								End of Boring at 20'		255.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-8

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **8'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Rain** TEMP: **72° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **281.0**
DATUM: **See Remarks**
DATE START: **9/13/22**
DATE FINISH: **9/13/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	9	3 4 5 9	S-1	19		M	SM	3" topsoil-like material Bwn c-f SAND, some Silt, trace c-f Gravel (FILL)		
3	45	15 20 25 23	S-2	23		M	SM	Bwn-tn c-f SAND, some Silt, little c-f Gravel		
5	51	20 27 24 27	S-3	24		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, some Silt		276.0
7	50+	50/4	S-4	4		M	SM	Bwn c-f SAND, some c-f Gravel, some Silt Drilled to 8 feet bgs, auger refusal at 8 feet See Boring SB-8A		
8								End of Boring at 8'		
10										271.0
15										266.0
20										261.0
25										256.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

BORING No. SB-8A

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**
SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **20'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **281.0**
DATUM: **See Remarks**
DATE START: **9/14/22**
DATE FINISH: **9/14/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–8								Boring B-8A offset 7 feet north of boring B-8. No SPT sampling performed to 8 feet		276.0
9–10	13	11 7 6 5	S-1	14		M	GP-GM	Bwn c-f GRAVEL, and m-f Sand, trace Silt		271.0
11–12	18	6 6 12 13	S-2	12		M	SM	Bwn c-f SAND, some Silt, little c-f Gravel		
13–15										266.0
16	115+	23 65 50/3	S-3	10		M	SM	Bwn-gy c-f SAND, some c-f Gravel, some Silt		115
17–20										261.0
20	50+	50/4	S-4	4		M	GM	Gy-bwn c-f GRAVEL, some c-f Sand, little Silt		
21–25								End of Boring at 20.3'		256.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-9

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **9/15/22**
DATE FINISH: **9/15/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	40	2 10 30 13	S-1	15		M	GM	4" topsoil-like material Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)		
3	30	9 9 21 29		18		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, some Silt (FILL)		
5	58	20 32 26 23	S-3	14		M	GM	Gy-wht-bwn c-f GRAVEL, some c-f Sand, little Silt (FILL)		267.0
7	35	19 17 18 15	S-4	16		M	SW-SM	Bwn c-f SAND, and f Gravel, little Silt		
9	12	7 7 5 4	S-5	12		W	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt		262.0
11	6	3 3 3 WOH	S-6	6		W	GM	Same		
13										
15										257.0
16	22	10 13 9 6	S-7	6		W	GM	Bwn c-f GRAVEL, some c-f Sand, little Silt		
18										
20										252.0
21	5	2 3 2 4	S-8	18		W	SM	Bwn c-f SAND, some Silt, trace m-f Gravel		
23										
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-9

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	7	5 3 4 6	S-9	24		W	SM	Bwn c-f SAND, and Silt, little c-f Gravel		
27										
28										
29										
30										242.0
31	4	WOH 2 2 4	S-10	12		W	SM	Bwn c-f SAND, and Silt, trace c-f Gravel		
32										
33								End of Boring at 32'		
34										
35										237.0
36										
37										
38										
39										
40										232.0
41										
42										
43										
44										
45										227.0
46										
47										
48										
49										
50										222.0
51										
52										
53										
54										
55										217.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-10

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **25'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **80° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Daniela Parrino**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **272.0**
DATUM: **See Remarks**
DATE START: **9/15/22**
DATE FINISH: **9/15/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	34	6, 6, 28, 16	S-1	10		M	GM	3" topsoil-like material Bwn-gy c-f GRAVEL, and c-f Sand, little Silt (FILL)		
3	33	12, 16, 17, 12	S-2	14		M	GM	Same (FILL)		
5	7	9, 5, 2, 2	S-3	13		M	ML	Bwn SILT, and f Sand, little c Gravel		267.0
7	5	2, 2, 3, 2	S-4	18		M	SM	Gy c-f SAND, and Silt		
9	12	3, 5, 7, 6	S-5	18		W	SM	Bwn-or c-f SAND, some Silt, little c-f Gravel		
11	15	6, 7, 8, 8	S-6	24		W	SM	Bwn c-f SAND, some Silt, little c-f Gravel		262.0
13										
15										257.0
16	7	2, 4, 3, 3	S-7	20		W	SM	Bwn c-f SAND, some m-f Gravel, little Silt		
18										
20										252.0
21	28	4, 10, 18, 15	S-8 S-8A	18		W	SM GM	Top 9" Bwn-gy c-f SAND, some Silt, trace m-f Gravel Bottom 9" Gy-rd c-f GRAVEL, some c-f Sand, some Silt		
23										
25										247.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-10

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	33	31 23 10 9	S-9	18		W	GM	Same		
27								End of Boring at 27'		242.0
30										237.0
35										232.0
40										227.0
45										222.0
50										217.0
55										

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-11

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **275.5**
DATUM: **See Remarks**
DATE START: **8/26/22**
DATE FINISH: **8/26/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	20	2, 11, 9, 12	S-1	14		M	SM	4" topsoil-like material Bwn c-f SAND, some Silt, little c-f Gravel (FILL)		
3	23	14, 10, 13, 14	S-2	16		M	GM	Bwn-wht c-f GRAVEL, and Silt, some c-f Sand (FILL)		
5	11	9, 6, 5, 3	S-3	7		M	SW-SM	Bwn c-f SAND, and f Gravel, trace Silt		270.5
7	3	2, 1, 2, 1	S-4	3		M	SW-SM	Bwn c-f SAND, and f Gravel, trace Silt		
9	6	2, 2, 4, 2	S-5	0				No Recovery		
11	6	3, 3, 3, 7	S-6	3		W	SM	Bwn c-f SAND, little f Gravel, little Silt		265.5
13										
15										260.5
16	4	2, 2, 2, 2	S-7	22		W	SM	Bwn m-f SAND, little Silt, trace f Gravel		
18										
20	2	WOH, 1, 1, WOH	S-8	24		W	SM	Same		255.5
22										
25										250.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-11

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	8	4 4 4 4	S-9	12		W	SM	Same		
27										
28										
29										
30										245.5
31	9	3 4 5 9	S-10	15		W	SM	Bwn m-f SAND, little Silt, trace f Gravel		
32										
33								End of Boring at 32'		
34										
35										240.5
36										
37										
38										
39										
40										235.5
41										
42										
43										
44										
45										230.5
46										
47										
48										
49										
50										225.5
51										
52										
53										
54										
55										220.5

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-12

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **26.5'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **276.5**
DATUM: **See Remarks**
DATE START: **8/26/22**
DATE FINISH: **8/26/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	29	11 14 15 16	S-1	9		M	SM	3" topsoil-like material Bwn m-f SAND, some Silt, trace c-f Gravel (FILL)		
3	12	11 7 5 5	S-2	10		M	SM	Bwn c-f SAND, and f Gravel, little Silt (FILL)		
5	27	7 12 15 9	S-3	12		M	GM	Bwn-wht c-f GRAVEL, some c-f Sand, some Silt (FILL)		271.5
7	14	6 7 7 10	S-4	15		M	SM	Bwn c-f SAND, little f Gravel, little Silt		
16	11	8 5 6 3	S-5	3		W	SM	Bwn c-f SAND, and f Gravel, little Silt		266.5 / 261.5
21	16	6 7 9 9	S-6	10		W	SM	Bwn-gy c-f SAND, little f Gravel, little Silt		256.5 / 251.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School**

LOCATION: **Thiells, NY**

BORING No. SB-12

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	81+	4 31 50/2	S-7	18		W	GM	Gy-rd c-f GRAVEL, some c-f Sand, little Silt Auger refusal at 26.5 feet bgs		81
27								End of Boring at 26.5'		
30										246.5
35										241.5
40										236.5
45										231.5
50										226.5
55										221.5

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-13

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **3 1/4"** | **0** TO **30'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC track-mounted drill rig with automatic hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **William Guerrieri**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **273.0**
DATUM: **See Remarks**
DATE START: **8/26/22**
DATE FINISH: **8/26/22**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	29	3, 13, 16, 20	S-1	16		M	SM	2" topsoil-like material Bwn c-f SAND, some f Gravel, little Silt (FILL)		
3			S-2	0				Drilled through obstruction between 2 and 4 feet bgs, no sample obtained		
5	16	7, 8, 8, 9	S-3	8		M	SM	Bwn m-f SAND, some Silt, little f Gravel		268.0
7	18	5, 6, 12, 13	S-4	18		M	GM	Bwn-blk-wht c-f GRAVEL, some c-f Sand, little Silt		
9	21	10, 9, 12, 9	S-5	16		M	SM	Bwn c-f SAND, little f Gravel, little Silt		263.0
11	18	7, 8, 10, 4	S-6	24		W	SM	Bwn c-f SAND, and c-f Gravel, little Silt		
13										
15										258.0
16	25	10, 14, 11, 6	S-7	14		W	SM	Bwn c-f SAND, little f Gravel, little Silt		
18										
20										253.0
21	28	14, 14, 14, 10	S-8	9		W	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt		
23										
25										248.0

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School**
LOCATION: **Thiells, NY**

BORING No. SB-13

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	56	20 27 29 40	S-9	7		W	SM	Gy-bwn c-f SAND, little f Gravel, little Silt		
27										
28										
29										
30	50+	50/0	S-10	0				No recovery in spoon Auger refusal at 30 feet bgs		243.0
31								End of Boring at 30'		
32										
33										
34										
35										238.0
36										
37										
38										
39										
40										233.0
41										
42										
43										
44										
45										228.0
46										
47										
48										
49										
50										223.0
51										
52										
53										
54										
55										218.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Surface elevations estimated based on a topographic survey provided by The LA Group, dated May 2022.

BORING LOG 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

LEGEND FOR SOIL DESCRIPTION

COARSE GRAINED SOIL (Coarser then No. 200 Sieve)

DESCRIPTIVE TERM & GRAIN SIZE

TERM	SAND					GRAVEL
coarse - c	No.	4	Sieve to No.	10	Sieve	3" to 3/4"
medium - m	No.	10	Sieve to No.	40	Sieve	3/4" to 3/16"
fine - f	No,	40	Sieve to No.	200	Sieve	

COBBLES 3" to 10"

BOULDERS 10" +

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
fine, f	Less than 10% coarse to medium
medium to fine, m-f	Less than 10% coarse
medium, m	Less than 10% coarse and fine
coarse to medium, c-m	Less than 10% fine
coarse, c	Less than 10% medium and fine
coarse to fine, c-f	All greater than 10%

FINE GRAINED SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0 - 1	none
Clayey Silt	2 - 5	slight
Silt & Clay	6 - 10	low
Clay & Silt	11 - 20	medium
Silty Clay	21 - 40	high
Clay	greater than 40	very high

PROPORTION

DESCRIPTIVE TERM	PERCENT OF SAMPLE WEIGHT
trace	1 - 10
little	10 - 20
some	20 - 35
and	35 - 50

The primary component is fully capitalized

COLOR

Blue - blue	Gy - gray	Wh - white
Blk - black	Or - orange	Yl - yellow
Bwn - brown	Rd - red	Lgt - light
Gn - green	Tn - tan	Dk - dark

SAMPLE NOTATION

S - Split Spoon Soil Sample
U - Undisturbed Tube Sample
C - Core Sample
B - Bulk Soil Sample
NR - No Recovery of Sample

WOC - Weight of Casing
WOR - Weight of Rods
WOH - Weight of Hammer
PPR - Compressive Strength based on Pocket Penetrometer
TV - Shear Strength (tsf) based on Torvane

ADDITIONAL CLASSIFICATIONS

New York City Building Code soil classifications are given in parentheses at the end of each description of material, if applicable. See sections 1804.2 of the 2008 Building Code for further details.

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/9/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Sunny Temperature: 97 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
INF-1	5'	4"	7:30AM		1.0	1.0	2.0	2.0		2.0
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-1 performed in northwest corner of existing turf field adjacent to running track.										
INF-2	5'	4"	7:40AM		3.0	0.0	4.0	1.0		2.0
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-2 performed in northeast corner of existing turf field adjacent to running track.										

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/9/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Sunny Temperature: 97 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-3	5'	4"	7:50AM		19.0	20.0	19.0	19.0	19.0
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-3 performed in southeast corner of existing turf field adjacent to running track.									
INF-4	5'	4"	8:00AM		24.0	24.0	24.0	24.0	24.0
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-4 performed in southwest corner of existing turf field adjacent to running track.									

Sketch Requirements

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Tectonic

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INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/9/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Sunny Temperature: 97 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-5	5'	4"	8:10AM		20.0	18.0	19.0	18.0	18.8
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-5 performed in the center of existing turf field adjacent to running track.									
INF-6	5'	4"	8:20AM		8.0	2.0	0.5	0.0	2.6
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-6 advanced within landscape area to the south of the existing running track.									

Sketch Requirements

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Tectonic

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Newburgh, NY 12550
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INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/10/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Partly Cloudy Temperature: 85 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
INF-7	5'	4"	7:30AM		23.0	14.0	12.0	12.0		15.3
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-7 advanced in the northwest corner of the existing soccer field for proposed softball field.										
INF-8	5'	4"	7:40AM		5.0	7.0	24.0	24.0		15.0
			TIME		1 hour	2 hours	3 hours	4 hours		
COMMENTS: INF-8 advanced in the northeast corner of the existing soccer field for proposed softball field.										

Sketch Requirements

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Indicate Property Lines

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INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/10/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Partly Cloudy Temperature: 85 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-9	5'	4"	7:50AM		24.0	24.0	24.0	21.0	23.3
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-9 advanced in the southern end of the existing soccer field for proposed baseball field.									
INF-10	5'	4"	8:00AM		24.0	24.0	16.0	13.0	19.3
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-10 advanced in the southeast corner of the existing athletic field for proposed baseball field.									

Sketch Requirements

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INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 8/10/2022

Client: North Rockland Central School District

Project: North Rockland High School

Project Engineer: Scott Cohen, P.E.

Inspector: Jessica Ouderkirk

Infiltration Test Location: (see reverse) See Boring and Infiltration Test Location Plan, Figure I

Weather Conditions: Partly Cloudy Temperature: 85 F

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1 hour intervals					STABLE RATE (in/hr)
INF-11	5'	4"	8:10AM		13.0	16.0	12.0	12.0	13.3
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-11 advanced in the existing baseball field for the proposed baseball field improvements (near first base).									
INF-12	5'	4"	8:20AM		24.0	24.0	24.0	24.0	24.0
			TIME		1 hour	2 hours	3 hours	4 hours	
COMMENTS: INF-12 advanced in the existing baseball field for the proposed baseball field improvements (near right field).									

Sketch Requirements

(To Be Completed On Back of Sheet)

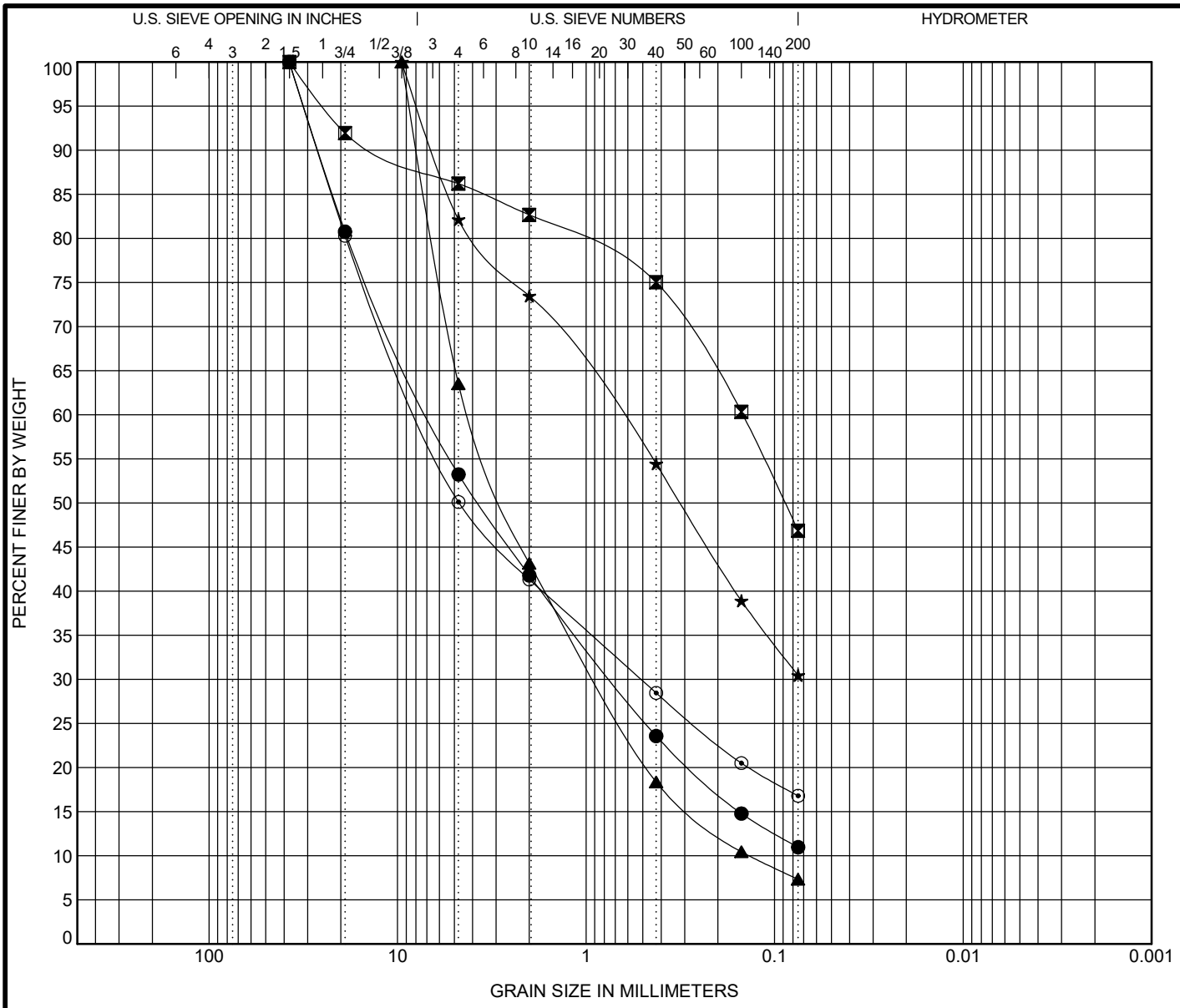
Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

APPENDIX II



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-1	2.0	S-2	Bwn c-f GRAVEL, and c-f Sand, little Silt	4.3				1.28	106.13
⊠	B-10	4.0	S-3	Bwn SILT, and f Sand, little c Gravel	22.5					
▲	B-11	6.0	S-4	Bwn c-f SAND, and f Gravel, trace Silt	3.3				1.39	30.14
★	B-13	4.0	S-3	Bwn m-f SAND, some Silt, little f Gravel	3.6					
⊙	B-3	8.0	S-5	Bwn-gy c-f GRAVEL, some m-f Sand, little Silt	4.7					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	B-1	2.0	S-2	37.5	6.679	0.734		46.8	42.3	11.0		Boring
⊠	B-10	4.0	S-3	37.5	0.147			13.8	39.4	46.8		Boring
▲	B-11	6.0	S-4	9.5	4.091	0.88	0.136	36.5	56.2	7.3		Boring
★	B-13	4.0	S-3	9.5	0.668			17.9	51.7	30.5		Boring
⊙	B-3	8.0	S-5	37.5	7.482	0.512		49.9	33.3	16.8		Boring

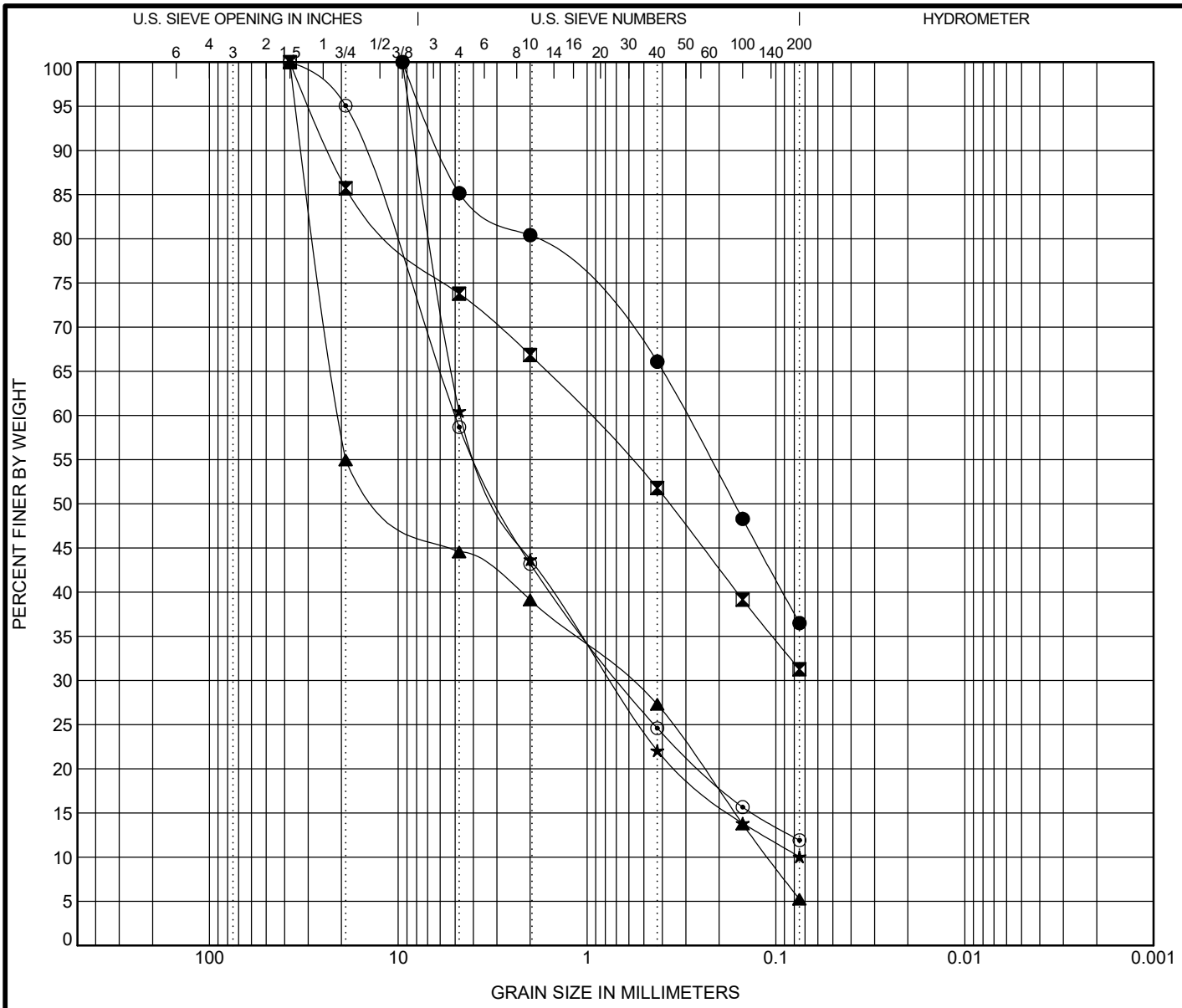
Tectonic
280 Little Britain Road, Bldg 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-5	6.0	S-4	Bwn m-f SAND, and Silt, little f Gravel	11.9					
⊠	B-7A	4.0	S-1	Bwn m-f SAND, some Silt, some c-f Gravel	6.7					
▲	B-8A	8.0	S-1	Bwn c-f GRAVEL, and m-f Sand, trace Silt	8.6				0.16	185.38
★	B-9	6.0	S-4	Bwn c-f SAND, and f Gravel, little Silt	3.7				1.63	62.36
⊙	PB-1	0.0	S-1	Bwn c-f SAND, and f Gravel, little Silt	2.5				1.69	94.84

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	B-5	6.0	S-4	9.5	0.298			14.8	48.7	36.5		Boring
⊠	B-7A	4.0	S-1	37.5	0.989			26.2	42.5	31.3		Boring
▲	B-8A	8.0	S-1	37.5	20.504	0.606	0.111	55.5	39.3	5.2		Boring
★	B-9	6.0	S-4	9.5	4.634	0.75		39.5	50.4	10.1		Boring
⊙	PB-1	0.0	S-1	37.5	4.996	0.666		41.3	46.8	11.9		Boring

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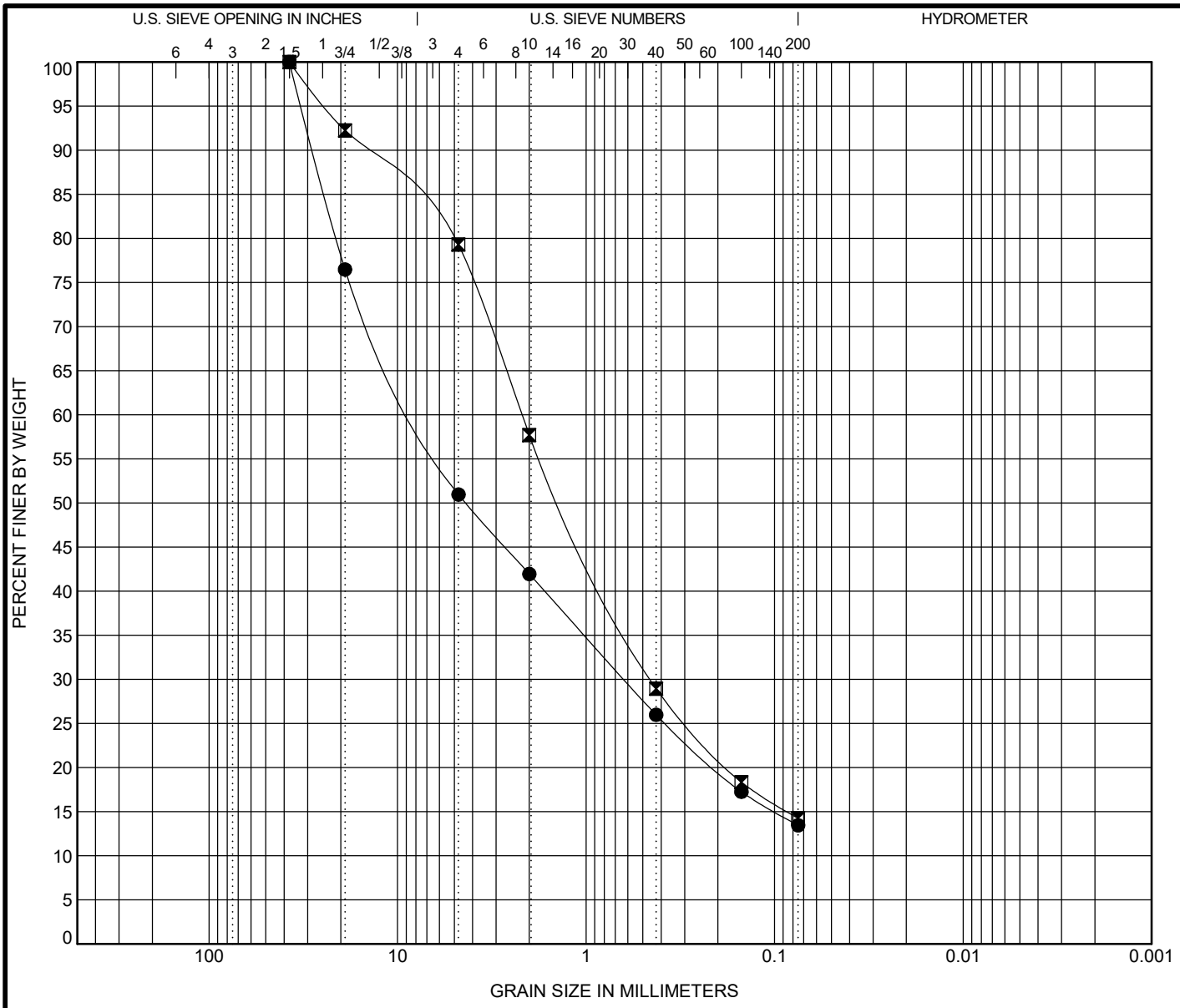
GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	**PB-3**	**0.0**	**S-1**	**Bwn c-f GRAVEL, and m-f Sand, little Silt**	**2.9**					
⊠	**PB-4**	**0.0**	**S-1**	**Bwn c-f SAND, some f Gravel, little Silt**	**3.3**					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	**PB-3**	**0.0**	**S-1**	**37.5**	**7.763**	**0.628**		**49.0**	**37.5**	**13.4**		**Boring**
⊠	**PB-4**	**0.0**	**S-1**	**37.5**	**2.194**	**0.45**		**20.7**	**65.1**	**14.2**		**Boring**

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GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**

GRAIN SIZE DISTRIBUTION 11584.01.GPJ TECTONIC ENG.GDT 10/18/22

Boring #	Depth (Ft.)	Sample #	Specimen Description % Gravel : % Sand : % Fines	USCS	Water Content	Liquid Limit	Plastic Limit	Plasticity Index	Penetro-meter (tsf)	Torvane (tsf)	Dry Density (pcf)	Organic Content (%)	pH
B-1	2.0	S-2	Bwn c-f GRAVEL, and c-f Sand, little Silt 46.8 : 42.3 : 11.0		4								
B-10	4.0	S-3	Bwn SILT, and f Sand, little c Gravel 13.8 : 39.4 : 46.8		23								
B-11	6.0	S-4	Bwn c-f SAND, and f Gravel, trace Silt 36.5 : 56.2 : 7.3		3								
B-13	4.0	S-3	Bwn m-f SAND, some Silt, little f Gravel 17.9 : 51.7 : 30.5		4								
B-3	8.0	S-5	Bwn-gy c-f GRAVEL, some m-f Sand, little Silt 49.9 : 33.3 : 16.8		5								
B-5	6.0	S-4	Bwn m-f SAND, and Silt, little f Gravel 14.8 : 48.7 : 36.5		12								
B-6	10.0	S-6	Bwn SILT, some c-f Sand, little c-f Gravel **NON-PLASTIC: WILL NOT ROLL TO 1/8"**		13								
B-7A	4.0	S-1	Bwn m-f SAND, some Silt, some c-f Gravel 26.2 : 42.5 : 31.3		7								
B-8A	8.0	S-1	Bwn c-f GRAVEL, and m-f Sand, trace Silt 55.5 : 39.3 : 5.2		9								
B-9	6.0	S-4	Bwn c-f SAND, and f Gravel, little Silt 39.5 : 50.4 : 10.1		4								
PB-1	0.0	S-1	Bwn c-f SAND, and f Gravel, little Silt 41.3 : 46.8 : 11.9		2								
PB-3	0.0	S-1	Bwn c-f GRAVEL, and m-f Sand, little Silt 49.0 : 37.5 : 13.4		3								
PB-4	0.0	S-1	Bwn c-f SAND, some f Gravel, little Silt 20.7 : 65.1 : 14.2		3								

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Summary of Laboratory Results

Project No: **11584.01** Date: **10/18/22**

Project: **North Rockland High School**

Location: **Thiells, NY**

Our Story

For the past 30 years, Tectonic has delivered quality professional services in a timely and cost effective manner by pooling its talented staff into project teams that think, act, and perform as one integral unit. By carefully listening and collaborating with its clients, the firm is able to identify the key issues and assure stakeholder objectives are met in the final deliverables. Through innovating and adopting technological advances, the firm is able to generate unique solutions to improve our nation's deteriorating infrastructure and build safe sustainable communities.

As the world evolves, and its challenges grow more complex, Tectonic continues to innovate and provide the practical solutions and exceptional customer service its clients have trusted since its founding.

www.TectonicEngineering.com

Tectonic

MOUNTAINVILLE, NY (CORPORATE OFFICE)
70 Pleasant Hill Road, PO Box 37
Mountainville, NY, 10953
Phone: 845-534-5959
Fax: 845-534-59993

SECTION 020800
ASBESTOS ABATEMENT PROCEDURES

PART I – GENERAL

1.01 DESCRIPTION

A. All work under this contract shall be performed in strict accordance with the specifications and all applicable laws for asbestos removal projects. The Abatement Contractor shall furnish all labor, materials, supervision, services, insurance and equipment necessary for the complete and total removal of Asbestos-containing Materials (ACM) as described herein, in attachments to the specification, Job Specific Variance(s) and/or as directed by Ossining UFSD (here-in-after the "Owner") and/or the Owners Representative(s) to support the ***North Rockland High School Projects – Phase 1.***

B. Abatement Contractor shall provide for personnel air monitoring to satisfy OSHA regulation 29 CFR Parts 1926.1101(f). All work performed shall be in strict accordance with applicable provisions and regulations promulgated under New York State Department of Labor, Industrial Code 56 (ICR-56).

C. The Abatement Contractor shall satisfy the requirements for asbestos projects issued by the New York State Department of Labor concerning licensing and certification; notification; equipment; removal and disposal procedures; engineering controls; work area preparation; decontamination and clean-up procedures; and personnel air monitoring.

D. The Abatement Contractor shall be responsible for submittal of asbestos project notification(s) and applicable fees to EPA and NYSDOL concerning this project. Project notification(s) shall be made for the cumulative total of ACM to be removed as required by ICR-56-3.4. Work practices for each individual work area established shall be consistent with the quantity of ACM contained within that work area as defined in ICR-56-2.

E. The scope of work under this contract shall include the following:

1. All asbestos-containing materials (ACM) shall be removed in accordance with these specifications. The Abatement Contractor is responsible for field verification of estimated quantities, locations and other site conditions that may affect work.

2. All fixed objects remaining within the work area(s) shall be protected as required by Title 12 NYCRR Section 56-7.10(b) and as described in these specifications.

3. The containerization, labeling and disposal of all asbestos waste in accordance with applicable city, state and federal regulations and these specifications.

4. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to, ceiling tiles, ceiling finishes, wall finishes and/or floor finishes, etc.

5. The Abatement Contractor shall be responsible for any and all demolition required to access materials identified in scope of work and on associated drawings.

6. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner(s) immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. If the Abatement Contractor removes additional asbestos prior to the order to proceed the additional work will not be acknowledged.

7. Permissible working hours shall be Monday through Friday 7:00 A.M. to 4:00 P.M. and/or as defined by the Owner(s) and/or Owner's Representative(s). Holidays shall be considered weekends and not included for working days. Upon written approval from the Owner, the Abatement Contractor may work past these hours. The Abatement Contractor will incur any and all costs associated for work performed beyond the defined schedule including, but not limited to: abatement activities, project/air monitoring, custodial/staffing labor, overtime, mobilizations, etc.

8. Buildings will be turned over to the Abatement Contractor as is. At that time, all electrical services and HVAC systems in the proposed work areas will be shut down. Electricity and water supply will be maintained in the building for use by the Abatement Contractor. The Abatement Contractor is responsible for securing all power in the work area(s) and establishing all temporary GFCI hookups necessary to complete his work.

9. The Abatement Contractor shall remove all identified Asbestos-containing Materials (ACM) to building substrate(s); in areas indicted. Subsequent to final air clearances, the substrate(s) shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.

10. The Abatement Contractor must coordinate location of waste containers with the Facility and the Owner. Deliveries and storage of equipment must be coordinated with the Facility and the Owner.

11. All “Large” and “Small” asbestos abatement projects, as defined by 12 NYCRR56 shall not be performed while the building is occupied. The term “building” means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exists that do not pass through the occupied portion(s) and ventilation systems must be physically separated and sealed at the isolation barriers.

1.02 PRE-CONTRACT SUBMITTALS

Within three (3) days after bids are opened, the three (3) apparent low bidders shall be required to submit the following documentation:

A. Resume': Shall include the following:

1. Provide a list of projects of similar nature performed within the past two (2) years and include the dollar value of all projects. Provide project references to include owner, consultant, and air monitoring firms' name, contact person, address, and phone number, include location of project and date of completion.

2. Abatement Contractor license issued by New York State Department of Labor for asbestos work in accordance with ICR-56-3.

3. A list of owned equipment available to be used in the performance of the project.

4. The number of years engaged in asbestos removal.

5. An outline of the worker training courses, and medical surveillance program conducted by the Abatement Contractor.

6. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, special removal techniques, etc.
7. Documentation to the satisfaction of the Owner pertaining to the Abatement Contractor's financial resources available to perform the project. Such data shall include, but not be limited to, the firm's balance sheet for the last fiscal year.

B. Citations/Violations/Legal Proceedings

1. Submit a notarized statement describing any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous asbestos abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.

2. Answer the question: "Has your firm or its agents been issued a Stop Work order on any project within the last two years?" If "Yes" provide details as discussed above.

3. Answer the question: "Are you now, or have you been in the past, a party to any litigation or arbitrations arising out of your performance on Asbestos Abatement Contracts?" If "Yes" provide details as discussed in 1. above.

4. Describe any liquidated damages assessed within the last two years.

C. Preliminary Schedule

1. Provide a detailed schedule including work dates, work shift times, estimate of manpower to be utilized and the start and completion date for completion of each major work area.

1.03 DOCUMENTATION

A. The Abatement Contractor shall be required to submit the following and receive the Consultant's approval prior to commencing work on this project:

1. Provide documentation of worker training for each person assigned to the project. Documentation shall include copies of each workers valid New York State asbestos handler certificates (for those employees who may perform asbestos removal), documentation of current respirator fit test and current OSHA required training and medical examination.

2. The attached "Asbestos Employee Medical Examination Statement" and "Asbestos Employee Training Statement" forms shall be completed, signed and submitted for each worker assigned to the project. Records of all employee training and medical surveillance shall be maintained for at least forty (40) years. Copies of the records shall be submitted to the Consultant prior to commencement.

3. The Abatement Contractor shall submit proof of a current, valid license issued by the New York State Department of Labor pursuant to the authority vested in the Commissioner by section 906 of the Labor Laws, and that the employees performing asbestos related work on this project are certified by the State of New York as required in Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York latest edition. Copies of all licenses shall be submitted prior to the commencement of the project.

4. The Abatement Contractor shall submit a written respiratory protection program meeting the requirements of 29 CFR 1910.134 to the Consultant.

5. The name, address, social security number and NYS DOL certificate number of the person(s) who will supervise the asbestos project.

6. The name and address of the deposit or waste disposal site or sites where the asbestos materials are to be deposited or disposed of. This site must be approved by the Owner. The manifesting procedure must also be specified.

7. The name, address and New York State Dept. of Environmental Conservation ID Number of any transporters that are to be used to transport waste.

8. A written Standard Operation Procedure (SOP) that is designed and implemented to maximize protection against human exposure to asbestos dust. The SOP shall take into consideration the workers, visitors, building employees, general public and environment. As a minimum the procedures must include the following:

   a. Security for all work areas on an around-the-clock basis against unauthorized access.

   b. Project organization chart including the phone numbers of at least two responsible persons who shall be authorized to dispatch men and equipment to the project in the event of an emergency; including weekends.

   c. Description of protective clothing and NIOSH approved respirators to be used.

   d. Description of all removal methods to be used, including HEPA air filtration and decontamination sequence with special emphasis on any procedure that may deviate from these specifications.

   e. A list of manufacturers' certificates stating that all vacuums, negative air filtration equipment, respirators and air supply equipment meet OSHA and EPA requirements.

   f. A list of all materials proposed to be furnished and used under this contract.

   g. Emergency evacuation procedures in the event of fire, smoke or accidents such as injury from falling, heat exposure, electrical shock, etc.

   h. The name, address and ELAP number of the New York State Department of Health Certified Analytical Testing Laboratory the Contractor proposes to use for the OSHA monitoring.

9. A detailed plan, in triplicate, for the phasing of the project, division of work areas and location of decontamination facilities, waste containers and temporary office.

10. Work schedule, identifying firm dates and completion for actual areas. Bar chart or critical path chart indicating phases is required.

B. The Abatement Contractor shall post their NYS DOL contractor's license and maintain a daily log documenting the dates and time of the following items within each personal decontamination unit:

1. Meetings; purpose, attendants, discussion (brief)

2. Sign-in and sign-out of all persons entering the work area including name, date, time, social security number, position or function and general description of daily activity.

3. Testing of barriers and enclosure systems using smoke tubes prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.

4. Inspection of all plastic barriers, twice daily, by the asbestos supervisor.
5. Loss of enclosure integrity; special or unusual events, barrier breaches, equipment failures, etc.

6. Daily cleaning of enclosures.

7. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

C. Documentation with confirmation signature of Consultant's representative of the following shall be provided by the Abatement Contractor at the final closeout of the project.

1. Testing of barriers and enclosure systems using smoke tubes shall be performed prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.

2. Inspection of all plastic barriers.

3. Removal of all polyethylene barriers.

4. Consultant's inspections prior to encapsulation.

5. Removal of waste materials.

6. Decontamination of equipment (list items).

7. Consultant's final inspection/final air tests.

D. The Abatement Contractor shall provide records of <u>all</u> project information, to include the following which shall be submitted upon completion of the project and prior to approval of the Abatement Contractor's payment application:

1. The location and description of the abatement project.

2. The name, address and social security number of the person(s) who supervised the asbestos project.

3. Certified payroll documentation Pursuant to Article 8, Section 220 of the NYS Labor Law

4. Copies of EPA/NYSDOL Asbestos Certificates for all Workers and Supervisors employed on the Project.

5. Copies of Medical Approval and Respirator Fit Testing for all Asbestos Workers and Supervisors employed on the Project.

6. Copies of Abatement Contractors Daily Sign-In Sheets & Logs for persons entering and leaving the work area. – Title 12 NYCRR Part 56-7.3.

7. Copies of Abatement Contractor’s personal air sampling laboratory results.

8. The amounts and type of asbestos materials that was removed, enclosed, encapsulated, or disturbed.

9. The name and address of the deposit or waste disposal site or sites where the asbestos waste materials were deposited or disposed of and all related manifests, receipts and other documentation associated with the disposal of asbestos waste.

10. The name and address of any transporters used to transport waste and all related manifests, receipts and other documentation associated with the transport of asbestos waste.

11. All other information that may be required by state, federal or local regulations.

12. Copy of the Supervisor's Daily Project Log of events as described in 1.03 B, above.

1.04 NOTIFICATIONS AND PERMITS

A. The Abatement Contractor shall be required to prepare and submit notifications to the following agencies at least ten (10) days prior to the commencement of the project:

1. Asbestos NESHAPS Contact
U.S. Environmental Protection Agency
NESHAPS Coordinator, Air Facilities Branch
26 Federal Plaza
New York, New York 10007
(212) 264-7307

2. State of New York Department of Labor
Division of Safety and Health
Asbestos Control Bureau
State Office Building Campus, Building 12, Room 454
Albany, New York 12240

3. Owner(s): North Rockland CSD
65 Chapel Street
Garnerville, NY 10923
ATTN: Paul B. Rooney, Director of Facilities III
Ph. (845) 942-3028
E-mail. prooney@northrockland.org

4. Environmental Consultant(s): Quality Environmental Solutions & Technologies, Inc. (QuES&T)
1376 Route 9
Wappingers Falls, New York 12590
ATTN: Rudy Lipinski, Director of Field Operations
Ph. (845) 298-6031
Fx. (845) 298-6251
E-mail. rlipinski@qualityenv.com

B. The notification shall include but not be limited to the following information:

1. Name and address of Owner.

2. Name, address and asbestos handling license number of the Abatement Contractor.

3. Address and description of the building, including size, age, and prior use of the building or area; the amount, in square feet or linear feet of asbestos material to be removed; room designation numbers or other local information where asbestos material is found, including the type of asbestos material (friable or non-friable).

4. Scheduled starting and completion dates for removal.

5. Methods to be employed in abating asbestos containing materials.

6. Procedures and equipment, including ventilating/exhaust systems, that will be employed to comply with the Code of Federal Regulation (CFR) Title 40, Part 61 of the U.S. Environmental Protection Agency.

7. The name and address of the carting company and of the waste disposal site where the asbestos waste will be deposited.

NOTE: Notifications shall be submitted using standard forms as may be used by the respective agency.

For DOL (NYS) include "Asbestos Project Notification" form (DOSH-483) with proper fee, if required. For EPA include "Notification of Demolition and Renovation"; 40 CFR Part 61.

C. The Abatement Contractor shall secure any permits required by the city, town, county, or state that may be required and the cost for obtaining the permit shall be included in his base bid.

D. The Abatement Contractor shall erect warning signs around the work space at every point of potential entry into the work area in accordance with OSHA 1926.58k (2), (i). These signs shall bear the following information:

DANGER

CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

E. The Abatement Contractor shall post at entrances to the work place and immediate adjacent areas, notifications to building occupants which include the name and license number of the contractor, project location and size, amount and type of ACM, abatement procedures, dates of expected occurrence and name and address of the air monitor and laboratory in compliance with ICR 56-3.6.

F. The Abatement Contractor shall post a list of emergency telephone numbers at the job site which shall include the Owner's Representative, police, emergency squad, local hospital, Environmental Protection Agency, N.Y. State Department of Labor, Occupational Safety and Health Administration and the local Department of Health.

1.05 APPLICABLE STANDARDS

Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, applicable standards of the construction industry have the same force and effects (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith. Resolution of overlapping and conflicting requirements, which result from the application of several different industry standards to the same unit of work, shall be by adherence to the most stringent requirement.

A. Applicable standards listed in these Specifications form a part of this Specification and include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. ANSI:
   American National Standards Institute
   1430 Broadway
   New York, New York 10018

2. ASHRAE:
   American Society for Heating, Refrigerating
   and Air Conditioning Engineers
   1791 Tullie Circle NE
   Atlanta, Georgia 30329

3. ASTM:
   American Society for Testing and Materials
   1916 Race Street
   Philadelphia, Pennsylvania 19103

4. CFR
   Code of Federal Regulations Available
   from Government Printing Office
   Washington, District of Columbia 20402

5. CGA
   Compressed Gas Association
   1235 Jefferson Davis Highway
   Arlington, Virginia 22202
6. CS
   Commercial Standard of NBS
   (US Dept. of Commerce)
   Government Printing Office

7. EPA
   Environmental Protection Agency, Region II
   26 Federal Plaza
   New York, New York 10007
   Asbestos Coordinator - Room 802
   (212) 264-9538
   Part 61, Sub-Parts A & B
   National Emission Standard for Asbestos

8. FEDERAL SPECS
   Federal Specification (General Services Administration)
   7th and D Street, SW
   Washington, District of Columbia 20406

9. NBS
   National Bureau of Standards
   (US Department of Commerce)
   Gaithersburg, Maryland 20234

10. NEC
    National Electrical Code (by NFPA)

11. NFPA
    National Fire Protection Association
    Batterymarch Park
    Quincy, Massachusetts 02269

12. NIOSH
    National Institute for Occupational Safety and Health
    26 Federal Plaza
    New York, New York 10007

13. NYSDOH
    New York State Department of Health
    Bureau of Toxic Substance Assessment
    Room 359 - 3rd Floor
    Tower Building Empire State Plaza
    Albany, New York 12237

14. NYSDEC
    New York State Department of Environmental Conservation
    Room 136
    50 Wolf Road
    Albany, New York 12233-3245

15. NYSDOL
    State of New York Department of Labor
    Division of Safety and Health
    Asbestos Control Program
    State Campus
    Building 12
    Albany, New York 12240

16. OSHA

    Occupational Safety and Health Administration
    (US Department of Labor)
    New York Regional Office - room 3445
    1515 Broadway
    New York, New York 10036

17. UL

    Underwriters Laboratories
    333 Pfingsten Road
    Northbrook, Illinois 60062

B. Federal Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA):

   a. Asbestos Regulations
      Title 29, Part 1910, of the Code of Federal Regulations.

   b. Respiratory Protection
      Title 29, Part 1910, Section 134 of the Code of Federal Regulations.

   c. Construction Industry
      Title 29, Part 1926, of the Code of Federal Regulations.

   d. Access to Employee Exposure & Medical Records
      Title 29, Part 1910, Section 20 of the Code of Federal Regulations.

   e. Hazard Communication
      Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.

   f. Specifications for Accident Prevention Signs and Tags
      Title 29, Part 1910, section 145 of the Code of Federal Regulations.

2. U.S. Environmental Protection Agency (EPA):

   a. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice Title 40, Part 763, Subpart E of the Code of Federal Regulations.

   b. Worker Protection Rule
      40 CFR Part 763, Subpart G, CPTS 62044, FLR 2843-9
      Federal Register, Vol. 50, No. 134, 7/12/85, P28530-28540

   c. Regulation for Asbestos
      Title 40, Part 61, Subpart A of the Code of Federal Regulations

   d. National Emission Standard for Asbestos
      Title 40, Part 61, Subpart M (Revised Subpart B) of the Code of Federal Regulations

   e. Resource Conservation and Recovery Act (RCRA) 1976, 1980
      Hazardous and Solid Waste Amendments (HSWA) 1984
      Subtitle D, Subtitle C

3. U.S. Department of Transportation (DOT):

   a. Hazardous Substances: Final Rule Regulation 49 CFR, Part 171 and 172.

C. State Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. New York State Department of Environmental Conservation (DEC) Regulations regarding waste collection registration. Title 6, Part 364 of the New York State Official Compilation of Codes, Rules and Regulations - 6NYCRR 364.

2. New York State Right-To-Know Law

3. New York State Department of Labor Asbestos Regulations Industrial Code Rule 56.

4. New York State Department of Health, Title 10 Part 73 Asbestos Safety Program Requirements.

D. Standards: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. American National Standards Institute (ANSI)

a. Fundamentals Governing the Design and Operation of Local Exhaust Systems
Publication Z9.2-79

b. Practices for Respiratory Protection
Publication Z88.2-80

E. Guidance Documents: Those that discuss asbestos abatement work or hauling, and disposal of asbestos waste materials are listed below only for the Abatement Contractor's information. These documents do not describe the work and are not a part of the work of this contract.

EPA:

1. Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book) EPA560/5-85-024.

2. Asbestos Waste Management Guidance EPA 530-SW-85-007.

F. Patents and Royalties: The Abatement Contractor shall pay all royalties and/or license fees. The Abatement Contractor shall defend all suits and claims for infringement of any patent rights and save the Owner and Consultant harmless from loss including attorney fees on account thereof.

1.06 DEFINITIONS

As used in or in connection with these specifications the following are terms and definitions.

Abatement - Procedure to control release from asbestos material. This includes removal, encapsulation and enclosure.

Aggressive sampling - A method of sampling in which the person collecting the air sample creates activity by the use of mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.

AIHA - The American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311.

Airlock - A system for permitting entrance and exit while restricting air movement between a containment area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

Air sampling - The process of measuring the content of a known volume of air collected during a specific period of time.

Amended water - Water to which a surfactant has been added.

Approved asbestos safety program - A program approved by the Commissioner of Health providing training in the various disciplines that may be involved in an asbestos project.

Area air sampling - Any form of air sampling or monitoring where the sampling device is placed at some stationary location.

Asbestos - Any naturally occurring hydrated mineral silicate separable into commercially usable fibers, including chrysotile (serpentine), amosite (cumingtonite-gunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

Asbestos contract - An oral or written agreement contained in one or more documents for the performance of work on an asbestos project and includes all labor, goods and service.

Asbestos handler - An individual who installs, removes, applies, encapsulates, or encloses asbestos or asbestos material, or who disturbs friable asbestos. Only individuals certified by NYS Department of Labor shall be acceptable for work under this specification.

Asbestos handling certificate - A certificate issued by the Commissioner of Labor of the State of New York, to a person who has satisfactorily completed an approved asbestos safety program.

Asbestos project - Work undertaken by a contractor which involves the installation, removal, encapsulation, application or enclosure of any ACM or the disturbance of friable ACM.

Asbestos Safety Technician (AST) - Individual designated to represent the Consultant, perform third party monitoring and perform compliance monitoring at the job site during the asbestos project.

Asbestos waste material - Asbestos material or asbestos contaminated objects requiring disposal.

Authorized visitor - The building owner, his or her representative or any representative of a regulatory or other agency having jurisdiction over the project.

Background level monitoring - A method used to determine ambient airborne concentrations inside and outside of a building or structure prior to starting an abatement project.

Building owner - The person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.

Clean room - An uncontaminated area or room that is a part of the personal decontamination enclosure with provisions for storage of persons' street clothes and protective equipment.

Cleanup - The utilization of HEPA vacuuming to control and eliminate accumulations of asbestos material and asbestos waste material.

Clearance air monitoring - The employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers upon conclusion of an asbestos abatement project.

Commissioner - Commissioner of the New York State Department of Labor.

Contractor - A company, unincorporated association, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in an asbestos project.

Curtained doorway - A device that consists of at least three overlapping sheets of plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and the left side. All sheets shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.

Decontamination enclosure system - A series of connected rooms, separated from the work area and from each other by air locks, for the decontamination of persons, materials, equipment, and authorized visitors.

Encapsulant (sealant) or encapsulating agent - A liquid material that can be applied to asbestos material and which prevents the release of asbestos from the material by creating a membrane over the surface.

Enclosure - The construction of airtight walls, ceilings and floors between the asbestos material and the facility environment, or around surfaces coated with asbestos materials, or any other appropriate procedure that prevents the release of asbestos materials.

Equipment room - A contaminated area or room that is part of the personal decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.

Fixed object - A unit of equipment, furniture or other fixture in the work area which cannot be readily removed from the work area.

Friable Asbestos Material - That condition of crumbled, pulverized, powdered, crushed or exposed asbestos capable of being released into the air by hand pressure.

Friable material containment - The encapsulation or enclosure of any friable asbestos material.

Glovebag technique - A method for removing asbestos material from heating, ventilating, and air conditioning (HVAC) ducts, piping runs, valves, joints, elbows, and other nonplanar surfaces in a noncontained work area. The glovebag assembly is a manufactured device consisting of a glovebag constructed of at least six mil transparent plastic, two inward-projecting longsleeve gloves, which may contain an inward projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle or portion for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and to contain all asbestos fibers released during the abatement process.

HEPA filter - A high efficiency particulate air filter capable of trapping and retaining 99.97 percent of particulate greater than 0.3 microns equivalent aerodynamic diameter.

HEPA vacuum equipment - Vacuuming equipment with a high efficiency particulate air filtration system.

Holding area - A chamber in the waste decontamination enclosure located between the washroom and an adjacent uncontaminated area.

Homogeneous work area - A site within the abatement work area that contains one type of asbestos material and where one type of abatement is used.

Large asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 160 square feet or more of asbestos or asbestos material or 260 linear feet or more of asbestos or asbestos material.

Minor asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material.

Movable object - A unit of equipment, furniture or fixture in the work area that can be readily removed from the work area.

Negative air pressure equipment - A local exhaust system equipped with HEPA filtration. The system shall be capable of creating and maintaining a negative pressure differential between the outside and the inside of the work area.

Non-asbestos material - Any material containing one percent or less asbestos by weight.

Occupied area - Any frequented portion of the work site where abatement is not taking place.

Outside air - The air outside the building or structure.

Personal air monitoring - A method used to determine an individual’s exposure to airborne contaminants. The sample is collected outside the respirator in the person's breathing zone.

Plasticize - To cover floors, walls, ceilings and other surfaces with 6 mil fire retardant plastic sheeting as herein specified.

Project - Any form of work performed in connection with the abatement of asbestos or alteration, renovation, modification or demolition of a building or structure that may disturb asbestos or asbestos material.

Removal - The stripping of any asbestos material.

Repair - Corrective action using required work practices to control fiber release from damaged areas.

Respiratory protection - Respiratory protection required of licensed asbestos workers and authorized visitors in accordance with the applicable laws.

Satisfactory clearance air monitoring results - For all post- abatement samples, airborne concentrations of total fibers that are less than 0.01 fibers per cubic centimeter or background levels, whichever are greater, using phase contrast microscopy (PCM).

Shower room - A room between the clean room and the equipment room in the personal decontamination enclosure with hot and cold running water controllable at the top and arranged for complete showering during decontamination.

Small asbestos project - An asbestos project involving the installation, removal, disturbances, enclosure, or encapsulation of more than 10 and less than 160 square feet of asbestos or asbestos material of more than 25 and less than 260 linear feet of asbestos or asbestos material.

Staging area - The area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

Surfactant - A chemical wetting agent added to water to improve its penetration.

Visible emissions - An emission of particulate material that can be seen without the aid of instruments.

Washroom - A room between the work area and the holding area in the waste decontamination enclosure system, where equipment and waste containers are wet cleaned and/or HEPA vacuumed.

Waste decontamination enclosure system - An area, consisting of a washroom and a holding area, designated for the controlled transfer of materials and equipment.

Wet cleaning - The process of eliminating asbestos contamination from surfaces, equipment or other objects by using cloths, mops, or other cleaning tools.

Work area - Designated rooms, spaces, or areas where asbestos abatement takes place.

Work site - Premises where asbestos abatement is taking place.

Work Surface - Substrate surface from which asbestos-containing material has been removed.

1.07 UTILITIES, SERVICE AND TEMPORARY FACILITIES

A. The Owner shall make available to the Abatement Contractor all reasonable amounts of water and electrical power at no charge.

B. The Abatement Contractor shall provide, at his own expense, all electrical, water, and waste connections, extensions, and construction materials, supplies, etc. All connections must be approved in advance by the Owner and all work relative to the utilities must be in accordance with the applicable building codes.

C. The Abatement Contractor shall provide scaffolding, ladders and staging, etc. as necessary to accomplish the work of this contract. The type, erection and use of all scaffolding, ladders and staging, etc. shall comply with all applicable OSHA provisions.

D. All connections to the Owner's water system shall include reduced pressure backflow protection or double check and double gate valves. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.

E. The Abatement Contractor shall use only heavy-duty abrasion resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each decontamination unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment. All water must be shut off at the end of each shift.

F. The Abatement Contractor shall provide service to decontamination unit electrical subpanel with minimum 60-amp, 2 pole circuit breaker or fused disconnect and ground-fault circuit interrupters (GFCI), reset button and pilot light, connected to the building's main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work. This electrical subpanel shall be used for hot water heater, PAPR battery recharging and air sampling pumps.

G. The Abatement Contractor shall provide UL rated 40-gallon electric hot water heater to supply hot water for the decontamination unit shower. Activate from 30-amp circuit breaker on the electrical subpanel located within the decontamination unit. Provide with relief valve compatible with water heater operation, relief valve down to drip pan on floor with type L copper. Wiring of the hot water heater shall follow NEMA, NEC, and UL standards.

H. The Abatement Contractor shall provide identification warning signs at power outlets, which are other than 110-120-volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 plugs into higher voltage outlets. Dry transformers shall be provided where required to provide voltages necessary for work operations. All outlets or power supplies shall be protected by ground fault circuit interrupter (GFCI) at the power source.

I. The Abatement Contractor shall use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.

J. The Abatement Contractor shall provide general service incandescent lamps of wattage indicated or required for adequate illumination; Protect lamps with guard cages or tempered glass enclosures; Provide exterior fixtures where fixtures are exposed to moisture.

K. The Abatement Contractor shall provide temporary heat or air conditioning as necessary to maintain comfortable working temperatures inside and immediately outside the work areas. Heating and A/C equipment shall have been tested and labeled by UL, FM or another recognized trade association related to the fuel being used. Fuel burning heaters shall not be used inside containment areas. The Contractor shall also provide a comfortable working environment for occupied areas that are impacted by the asbestos removal.

L. The Abatement Contractor shall comply with recommendations of the NFPA standard in regard to the use and application of fire extinguishers. Locate fire extinguishers where they are most convenient and effective for their intended purpose but provide not less than one extinguisher in each work area, equipment room, clean room and outside the work area.

1.08 REMOVAL OF FIXTURES

A. In locations where the Abatement Contractor is directed to dispose of fixtures, he shall either decontaminate the fixtures and dispose of them as non-asbestos containing materials or he shall place them in an appropriate container and dispose of them as asbestos containing material.

B. In locations where the Abatement Contractor is directed to remove and reinstall fixtures, the fixtures shall be removed, decontaminated, labeled, protected with plastic and stored by the contractor in a location as directed by the Owner.

C. Upon completion of the asbestos removal and upon receiving satisfactory clearance air monitoring results, all items to be replaced shall be restored to their original location and reinstalled by the Abatement Contractor.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. GENERAL REQUIREMENTS

1. Materials shall be stored off the ground, away from wet or damp surfaces and under protective cover to prevent damage or contamination.

2. Damaged or deteriorating materials shall not be used and shall be removed from the premises.

3. Power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

4. The Abatement Contractor shall make available to authorized visitors, ladders and/or scaffolds of sufficient dimension and quantity so that all work surfaces can be easily and safely reached for inspection. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos. Scaffolds and ladders shall comply with all applicable codes.

B. PLASTIC BARRIERS (POLYETHYLENE)

1. In sizes and shapes to minimize the number of joints.

   a. Six mil. (.006") fire-retardant for vertical protection (walls, entrances and openings).

   b. Six mil. (.006") fire-retardant for horizontal protection (fixed equipment) and heating grilles.

   c. Six mil. (.006") reinforced fire-retardant for floors of decon units.

2. Provide two (2) layers over all roof, wall and ceiling openings. Floor penetrations shall be sealed with a rigid material prior to plasticizing to prevent tripping and fall hazards. All seams within a layer shall be separated by a minimum distance of six feet and sealed airtight. All seams between layers shall be staggered.

3. Barrier Attachment - Commercially available duct tape (fabric or paper) and spray-on adhesive. Duct tape shall be capable of sealing joints of adjacent sheets of plastic, facilitating attachment of plastic sheets to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions.

C. SIGNS

1. Danger signs shall be provided and shall conform to 29 CFR 1926.1101 and be 14" x 20". These signs shall bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE
CLOTHING
ARE REQUIRED IN THIS AREA

D. DANGER LABELS AND TAPE

1. Labels shall be affixed to any asbestos contaminated material in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication Standard, and shall contain the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID BREATHING DUST
CANCER AND LUNG DISEASE HAZARD

2. A label shall be affixed on each container of asbestos waste in accordance with the requirements of 49 CFR Parts 171 and 172, Hazardous Substances; Final Rule (U.S. Department of Transportation), and shall contain the following information:

RQ HAZARDOUS SUBSTANCE
SOLID, NOS, ORM-E, NA 9188
(ASBESTOS)

3. A label shall be affixed on each container of asbestos waste in accordance with the requirements of 40 CFR Part 61.150, NESHAP; Asbestos; Final Rule (USEPA) and shall contain the name of the waste generator and the location at which the waste was generated.

NOTE: All containers marked as above (1,2 and 3) shall be disposed of as asbestos waste.

4. Provide 3" red barrier tape printed with black lettered "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos work area.

E. PROTECTIVE EQUIPMENT

1. Respiratory Requirements

a. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators are the minimum allowable respiratory protection permitted to be utilized during removal operations.

b. Where not in violation of NIOSH, OSHA, and any other regulatory requirements, the Abatement Contractor shall provide the following minimum respiratory protection to the maximum use concentrations indicated:

MSHA/NIOSH Approved Respiratory Protection	Maximum Use Concentration
Half-Mask Air Purifying with HEPA Filters	10x PEL
Full-Facepiece Air Purifying HEPA Filters and Quantitative Fit Test	10x PEL
Powered Air Purifying (PAPR), Loose fitting Helmet or Hood, HEPA Filter	25x PEL
Powered Air Purifying (PAPR), Full Facepiece, HEPA Filter	50x PEL
Supplied Air, Continuous Flow Loose fitting Helmet or Hood	25x PEL
Supplied Air, Continuous Flow Full Facepiece, HEPA Filter	50x PEL
Full Facepiece-Supplied Air Pressure Demand, HEPA Filter	100x PEL
Full Facepiece-Supplied Air Pressure Demand, with Aux. SCBA, Pressure Demand or Continuous Flow	>100x PEL

2. Disposable Clothing -"Tyvek" manufactured by Dupont or approved equal.

3. NIOSH approved safety goggles to protect eyes.

4. Polyethylene bags, 6 mil. (.006") thick (use double bags).

NOTE: Workers must always wear disposable coveralls and respirator masks while in the work area. Contaminated coveralls or equipment must be left in work area and not worn into other parts of the building.

F. TOOLS AND EQUIPMENT

1. Airless Sprayer - An airless sprayer, suitable for application of encapsulating material, shall be used.

2. Scaffolding - Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.

3. Transportation Equipment - Transportation equipment, as required, shall be suitable for loading, temporary storage, transport and unloading of contaminated waste without exposure to persons or property. Watertight, hard wall containers shall be provided to retain and dispose of any asbestos waste material with sharp-edged components that may tear plastic bags or sheeting. The containers shall be marked with danger labels.

4. Surfactant - Wetting Agents - "Asbestos-Wet" - Aquatrols Corp. of America or approved equal and shall be non-carcinogenic.

5. Portable (negative air pressure) asbestos filtration system - by Micro-Trap or approved equal.

6. Vacuum, HEPA type equal to "Nilfisk" #GA73, or "Pullman/Holt" #75 ASA.

7. Amended Water Sprayer - The water sprayer shall be an airless or other low-pressure sprayer for amended water application.

8. Other Tools and Equipment - The Abatement Contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, nylon brushes, sponges, rounded edge shovels, brooms, and carts.

PART 3 – EXECUTION

3.01 PRE-ABATEMENT WORK AREA PREPARATION

A. The work area shall be vacated by the occupants prior to work area preparation and not reoccupied until satisfactory clearance air monitoring results have been achieved.

B. Caution signs shall be posted at all locations and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted that permit a person to read the sign and take the necessary protective measures to avoid exposure.

C. Shut down and lock out electric power to all work areas. The Abatement Contractor shall provide temporary power and lighting and ensure safe installation of temporary power sources and equipment used where high humidity and/or water shall be sprayed in accordance with all applicable codes. All power to work areas shall be brought in from outside the area through a ground-fault interrupter at the source.

D. Isolate the work area HVAC system.

E. The personnel decontamination enclosure system shall be installed or constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material. The waste decontamination enclosure system shall be installed or constructed prior to commencement of abatement activities.

F. Movable objects within the work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning and such objects shall be removed from the work area to an uncontaminated location. If disposed of as asbestos waste material, cleaning is not required.

G. Fixed objects and other items, which are to remain within the work area, shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Such objects shall be enclosed with two layers of at least six mil plastic sheeting and sealed with tape.

H. The work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited. Asbestos material shall not be disturbed during pre-cleaning.

I. Isolation barriers that seal off all openings, including windows, corridors, doorways, ducts, and any other penetrations of the work area, shall be constructed using two layers of at least six mil fire-retardant plastic sheeting sealed with tape. Also, all seams in mechanical system components that pass through the work area shall be sealed. Doorways and corridors, which shall not be used for passage during work, shall also be sealed.

J. Removal of mounted objects. After isolation barriers are in place, objects such as light fixtures, electrical track, alarm systems, ventilation equipment and other items not previously sealed, shall be double sealed with six mil fire-retardant plastic sheeting. Localized HEPA filtered vacuum equipment shall be used during fixture removal to reduce asbestos dispersal.

K. Individual roof and floor drains shall be sealed watertight using two layers of 6-mil fire-retardant plastic sheeting and tape prior to plasticizing. Openings in floor shall be fully covered with plywood sheeting secured to the floor in such a way as to minimize a tripping hazard prior to plasticizing.

L. Emergency and fire exits from the work area shall be maintained or alternate exits shall be established according to all applicable codes.

M. Adequate toilet facilities shall be supplied by the Abatement Contractor and shall be located either in the clean area of the personnel decontamination enclosure or shall be readily accessible to the personnel decontamination enclosure.

3.02 LARGE ASBESTOS PROJECT PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. The personnel decontamination enclosure shall be constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material.

1. Construction and use of personnel decontamination enclosure systems shall be in accordance with ICR-56 and any Applicable or Site-Specific Variances utilized on this project. Such systems may consist of existing rooms outside of the work area, if the layout is appropriate, that can be enclosed is plastic sheeting and are accessible from the work area. When this situation does not exist, enclosure systems may be constructed out of metal, wood or plastic support.

2. The personnel decontamination enclosure system shall consist of a clean room, a shower room, and an equipment room, in series, separated from each other and from the work area by three airlocks.

3. There shall be one shower per six full shift abatement persons calculated on the basis of the largest shift.

4. The personnel decontamination enclosure system shall be fully framed, sheathed for safety and constructed to prevent unauthorized entry.

5. Personnel decontamination enclosure systems constructed at the work site shall utilize at least six mil fire-retardant opaque plastic sheeting. At least two layers of six mil fire-retardant reinforced plastic sheeting shall be used for the flooring of this area.

6. All prefabricated decontamination units shall be completely decontaminated and sealed prior to separation and removal from the work area. Mobile decontamination units shall remain in place until satisfactory clearance results have been attained.

7. The clean room shall be sized to accommodate all authorized persons. Benches, lockers and hooks shall be provided for street clothes. Shelves for storing respirators shall also be provided. Clean clothing, replacement filters for respirators, towels and other necessary items shall be provided. The clean room shall not be used for the storage of tools, equipment or materials. It shall not be used for office space. A lockable door shall be provided to permit access to the clean room from outside the work area or enclosure. It shall be used to secure the work area and decontamination enclosure during off-shift hours.

8. The shower room shall contain one or more showers. Each shower head shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. Uncontaminated soap, shampoo and towels shall be available at all times. Shower water shall be drained, collected and filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste. The shower room shall be constructed in such way that travel through the decontamination unit shall be through the shower.

9. The equipment room shall be used for the storage of equipment and tools after decontamination using a HEPA filtered vacuum and/or wet cleaning. A one day supply of replacement filters, in sealed containers, for HEPA vacuums and negative pressure ventilation equipment, extra tools, containers of surfactant and other materials and equipment that may be required during the abatement project may also be stored here. A walk-off pan filled with water shall be located in the work area just outside the equipment room for persons to clean foot covering when leaving the work area. A drum lined with a labeled, at least six mil plastic bag is required for collection of clothing and shall be located in this room. Contaminated footwear and work clothes shall be stored in this area.

3.03 WASTE DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. General Requirements

1. A waste decontamination enclosure system shall consist of the following:

   a. A washroom/cleanup room shall be constructed with an airlock doorway to the work area and another airlock doorway to the holding area.

   b. The holding area shall be constructed with an airlock doorway to the washroom/cleanup room and another lockable door to the outside.

2. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the equipment decontamination room, which doubles as a waste washroom, of the personnel decontamination enclosure.

3. The waste washroom shall be equipped with a drain installed to collect water and deliver it to the shower drain where it shall be filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

4. The waste washroom shall be constructed in such a way that travel through the rooms shall be through the waste washroom

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved:

1. All persons shall enter and exit the work area through the personnel decontamination enclosure system.

2. All persons who enter the work area or an enclosure shall sign the entry/exit log, located in the clean room, upon every entry and exit.

3. All persons, before entering the work area, or an enclosure shall read and be familiar with all posted regulations, personal protection requirements, including work area entry and exit procedures, and emergency procedures. The entry/exit log headings shall indicate, and the signatures shall be used to acknowledge, that these have been reviewed and understood by all persons prior to entry.

4. All persons shall proceed first to the clean room, remove all street clothing, store these items in clean sealable plastic bags or lockers and don coveralls, head covering, foot covering and gloves. All persons shall also don NIOSH approved respiratory protection. Clean respirators and protective clothing shall be utilized, by each person, for each separate entry into the work area. Respirators shall be inspected prior to each use and tested for proper seal using quantitative or qualitative fit checks.

5. Persons wearing designated personal protective equipment shall proceed from the clean room through the shower room to the equipment room, where necessary tools are collected and any additional clothing shall be donned, before entry into the work area.

6. Before leaving the work area, all persons shall remove gross contamination from the outside of respirators and protective clothing by brushing, wet cleaning, and/or HEPA vacuuming.

7. Persons shall proceed to the equipment room where all coveralls, head covering, foot covering and gloves shall be removed. Disposable clothing shall be deposited into labeled containers for disposal. Reusable contaminated clothing, footwear, head gear and gloves shall be stored in the equipment room when not being used in the work area.

8. Still wearing respirators, persons shall proceed to the shower area, clean the outside of the respirator and the exposed face area under running water prior to removal of the respirator, and then fully and vigorously shower and shampoo to remove residual asbestos contamination. Respirators shall be washed thoroughly with soap and water. Some types of respirators will require slight modification of these procedures. An airline respirator with HEPA filtered disconnect protection shall be disconnected in the equipment room and worn into the shower. A powered air-purifying respirator facepiece shall be disconnected from the filter/power pack assembly prior to entering the shower.

9. After showering and drying, all persons shall proceed to the clean room and don clean personal protective equipment if returning to the work area or street clothing if exiting the enclosure.

3.05 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION & REMOVAL PROCEDURES

A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved.

1. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. These work area persons shall not enter the airlock.

2. These contaminated items shall be removed from the airlock by persons stationed in the washroom during waste removal operations. These washroom persons shall remove gross contamination from the exterior of their respirators and protective clothing by brushing, HEPA vacuuming and/or wet cleaning.

3. Once in the waste decontamination enclosure system, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.

4. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting and sealed airtight.

5. The clean recontainerized items shall be moved into the airlock that leads to the holding area. The washroom persons shall not enter this airlock or the work area until waste removal is finished for that period.

6. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.

7. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.

8. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.

9. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

10. Containers labeled with Asbestos hazard warnings shall not be used to dispose of non asbestos waste.

3.06 ENGINEERING CONTROLS

A. Ventilation.

1. The Abatement Contractor shall employ HEPA equipped vacuums or negative air pressure equipment for ventilation as required.

2. All negative air pressure equipment ventilation units shall be equipped with HEPA filtration. The Contractor shall provide a manufacturer's test certificate for each unit documenting the capability of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns equivalent aerodynamic diameter.

3. A power supply shall be available to satisfy the requirements of the total of all ventilating units.

4. On electric power failure, abatement shall stop immediately and shall not resume until power is restored and exhaust units are operating fully. On extended power failure, longer than one hour, the decontamination facilities, after the evacuation of all persons from the work area, shall be sealed airtight.

5. If extending the exhaust of the ventilation units 50 feet from the building would result in an exhaust location either in the road, blocking driveway access to the facility or within 50 feet of other buildings, a second unit will be run in series with the primary unit.

3.07 MAINTENANCE OF DECONTAMINATION ENCLOSURE SYSTEMS AND WORK AREA BARRIERS

A. GENERAL REQUIREMENTS

1. The Consultant must review and approve installation before commencement of work. Upon completion of the construction of all plastic barriers and decontamination system enclosures and prior to beginning actual abatement activities.

2. All plastic barriers inside the work area, in the personnel decontamination enclosure system, in the waste decontamination enclosure system and at partitions constructed to isolate the work area from occupied areas, shall be inspected by the asbestos supervisor at least twice daily. The barriers shall be inspected before the start of and following the completion of the day's abatement activities. Inspections and observations shall be documented in the project log.

3. Damage and defects in the barriers and/or enclosure systems shall be repaired immediately upon discovery and prior to resumption of abatement activities.

4. At any time during the abatement activities, if visible emissions are observed outside of the work area of if damage occurs to the barriers, work shall be stopped, repairs made and visible residue immediately cleaned up using HEPA vacuuming methods prior to the resumption of abatement activities.

5. The Abatement Contractor shall HEPA vacuum and/or wet clean the waste decontamination enclosure system and the personnel decontamination enclosure system at the end of each day of abatement activities.

3.08 HANDLING AND REMOVAL PROCEDURES

The Abatement Contractor may utilize existing provisions of ICR-56, Applicable Variances or a Site-Specific Variance, approved by the Owner's Consultant, to permit the conduct of this work.

3.09 ABATEMENT PROCEDURES

A. AIR SAMPLING - By Owner

1. Air sampling and analysis shall be conducted according to the requirements of Subpart 56-4 before the start, during and after the completion of the asbestos removal project.

2. In addition to the requirements of Subpart 56-4, air monitoring shall be conducted in accordance with any approved job specific variance(s) or applicable variance utilized.

3. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.

4. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR 763.90[i].

B. The provisions of the Applicable Variances or a Job Specific Variance shall apply only in those areas where approval has been granted by the NYS DOL and the Contractor has obtained concurrence from the Owner's Consultant. All other applicable provisions of Industrial Code Rule 56-1 through 56-12 shall be complied.

C. A copy of the NYS DOL Job Specific or Applicable Variance, if applicable, shall be conspicuously posted at the work area(s).

D. The Abatement Contractor shall construct a decontamination unit at the work site. The Abatement Contractor shall, as a minimum, comply with the requirements of 29 CFR 1926.1101(j); Hygiene facilities and practices for employees.

3.10 ENCAPSULATION PROCEDURES

The following procedures shall be followed to seal in non-visible residue, after obtaining satisfactory clearance air monitoring results, while conducting lockdown encapsulation on any surfaces which were the subject of removal or other remediation activities:

A. Only encapsulants rated as acceptable or marginally acceptable on the basis of Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA contract shall be used for lockdown encapsulation.

B. Sealants considered for use in encapsulation shall first be tested to ensure that the sealant is adequate for its intended use. A section of the work surface shall be evaluated following this initial test application of the sealant to quantitatively determine the sealant's effectiveness in terms of penetrating and locking down the asbestos fibers. The American Society of Testing and Materials (ASTM) Committee E06.21.06E on Encapsulation of Building Materials has developed a guidance document to assist in the selection of an encapsulant.

C. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.

D. Encapsulants shall be applied using airless spray equipment.

1. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.

E. Encapsulation shall be utilized as a surface sealant once all asbestos containing materials have been removed in a work area. In no event shall encapsulant be applied to any surface that was the subject of removal or other remediation activities prior to obtaining satisfactory clearance air monitoring.

3.11 CLEANUP PROCEDURES

A. The following cleanup procedures shall be required.

1. Cleanup of accumulations of loose asbestos material shall be performed whenever enough loose asbestos materials have been removed to fill a single leak tight container of the type commensurate with the material properties. In no case shall cleanup be performed less than once prior to the close of each working day. Asbestos material shall be kept wet until cleaned up.

2. Accumulations of dust shall be cleaned off all surfaces on a daily basis using HEPA vacuum cleaning methods.

3. Decontamination enclosures shall be HEPA vacuumed at the end of each shift.

4. Accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste.

5. Excessive water accumulation or flooding in the area shall require work to stop until the water is collected and disposed of properly.

B. The following cleanup procedures shall be required after completion of all removal activities.

1. All accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pan, squeegees or shovels. Metal shovels shall not be used to pick up or move waste. HEPA vacuums shall be used to clean all surfaces after gross cleanup.

2. Cleaning. All surfaces in the work area shall be HEPA vacuumed. To pick up excess liquid and wet debris, a wet purpose shop vacuum may be used and shall be decontaminated prior to removal from the work area.

3. Windows, doors, HVAC system vents and all other openings shall remain sealed. Decontamination enclosure systems shall remain in place and be utilized.

4. All containerized waste shall be removed from the work area and the holding area.

5. All tools and equipment shall be decontaminated and removed from the work area.

6. A final visual inspection and clearance air monitoring, as per the schedule for air sampling and analysis, shall be conducted.

7. The isolation barriers and decontamination unit shall be removed only after satisfactory clearance air monitoring results have been achieved.

3.12 SAFETY MONITORING – CONSULTANT:

The Consultant will designate an Asbestos Safety Technician (AST) to represent the Owner during the removal program. The AST must be on the job site at all times during abatement work. Absolutely no abatement or preparation work will occur without the presence of the AST.

The AST will conduct four (4) milestone inspections.

1. Pre-commencement inspection shall be conducted as follows:

   a. Notification in writing to the Consultant shall be made by the Abatement Contractor to request a pre-commencement inspection at least 48 hours in advance of the desired date of inspection. This inspection shall be requested prior to beginning preparatory work in another work area.

   b. The AST shall ensure that:

      i. The job site is properly prepared and that all containment measures are in place;

      ii. The designated supervisor shall present to the inspector a valid supervisor's license issued by the New York Department of Labor;

      iii. All workers shall present to the inspector a valid handler's license issued by the New York Department of Labor;

      iv. Measures for the disposal of removed asbestos material are in place and shall conform to the adopted standards;

      v. The Abatement Contractor has a list of emergency telephone numbers at the job site which shall include the monitoring firm employed by the Owner and telephone numbers for fire, police, emergency squad, local hospital and health officer.

   c. If all is in order, the AST shall issue a written notice to proceed in the field. If the job site is not in order, then any needed corrective action must be taken before any work is to commence. Conditional approvals shall not be granted.

Progress inspection shall be conducted as follows:

   a. Primary responsibility for ensuring that the abatement work progresses in accordance with these technical specifications and regulatory requirements rests with the Abatement Contractor. The AST shall continuously be present to observe the progress of work and perform required tests.

   b. If the AST observes irregularities at any time, he shall direct such corrective action as may be necessary. If the Abatement Contractor fails to take the corrective action required, or if the Abatement Contractor or any of their employees habitually and/or excessively violate the requirements of any regulation, then the AST shall inform the Owner who shall issue a Stop Work Order to the Abatement Contractor and have the work site secured until all violations are abated.

Clean-up inspections shall be conducted as follows:

   a. Notice for clean-up inspection shall be requested by the Abatement Contractor at least 24 hours in advance of the desired date of inspection;

   b. The clean-up inspection shall be conducted prior to the removal of any isolation or critical barriers and before final air clearance monitoring;

   c. The AST shall ensure that:

      i. The work site has been properly cleaned and is free of visible asbestos containing material and debris.

ii. All removed asbestos has been properly placed in a locked secure container outside of the work area.

d. If all is in order, the AST shall issue a written notice of authorization to remove surface barriers from the work area. All isolation barriers shall remain in place until satisfactory clearance air sampling has been completed.

4. Clearance Visual Inspection shall be conducted after the removal of non-critical plastic sheeting. The AST shall insure that:

a. The work area is free of all visible asbestos or suspect asbestos debris and residue.

b. All waste has been properly bagged and removed from the work area.

c. Should clearance visual inspection identify residual debris, as determined by the AST, the Abatement Contractor is responsible for recleaning the area at his own cost and shall bear all costs of reinspection until acceptable levels are achieved.

B. The Abatement Contractor shall be required to receive written approval before proceeding after each milestone inspection.

3.13 PERSONNEL AIR MONITORING – CONTRACTOR (29 CFR 1926.1101)

A. Personnel air monitoring shall be provided to determine both short-term (STEL) and full shift during when abatement activities occur. Personnel sampling shall be performed in each work area in order to accurately determine the concentrations of airborne asbestos to which workers may be exposed.

B. The Abatement Contractor shall have a qualified "Competent Person" (as specified in 29 CFR 1926 OSHA) to conduct personnel air monitoring.

C. The laboratory performing the air sample analysis shall be certified by NYS DOH ELAP and approved by the consultant.

D. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

3.14 CLEARANCE AIR MONITORING

A. Air samples will be collected in and around the work areas at the completion of abatement activities.

B. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.

C. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR part 763 “Asbestos-Containing Materials in Schools; Final Rule and Notice” section 763.90.

D. ***RETESTING***
Should clearance air monitoring yield fiber concentrations above the “Clearance” criteria of either 0.01 fibers per CC and/or background levels (PCM) –OR- seventy (70) structures per square millimeter (TEM/AHERA), the Abatement Contractor is responsible for re-cleaning the area at his own cost and shall bear all costs associated with the retesting of the work area(s) including monitoring labor, sampling, analysis, etc. until such levels are achieved.

3.15 RESPIRATORY PROTECTION REQUIREMENT

A. Respiratory protection shall be worn by all individuals inside the work area from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with these specifications. The Abatement Contractor shall keep available at all times two PAPR's with new filters and charged batteries for use by authorized visitors.

B. All respiratory protection shall be MSHA/NIOSH approved in accordance with the provisions of 30 CFR Part II. All respiratory protection shall be provided by the Abatement Contractor and used by workers in conjunction with the written respiratory protection program.

C. The Abatement Contractor shall provide respirators that meet the requirements of 29 CFR Parts 1910 and 1926.

1. Full facepiece Type C supplied-air respirators operated in pressure demand mode equipped with an auxiliary self-contained breathing apparatus, operated in pressure demand or continuous flow, shall be worn during gross removal, demolition, renovation and/or other disturbance of ACM whenever airborne fiber concentrations inside the work area are greater than 10.0 f/cc.

2. Full facepiece Type C supplied-air respirators operated in pressure demand mode with HEPA filter disconnect protection shall be work during gross removal, demolition, renovation and/or other disturbance of ACM with an amphibole content and/or whenever airborne fiber concentrations inside the work area are equal to or greater than 0.5 f/cc and less than or equal to 10.0 f/cc.

3. Full facepiece powered air-purifying respirators (PAPR) equipped with HEPA filters shall be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.5 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow, with HEPA filter disconnect protection, may be substituted for a powered air-purifying respirator.

4. Loose fitting helmets or hoods with powered air-purifying respirators (PAPR) equipped with HEPA filters may be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.25 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow may be substituted for a powered air- purifying respirator.

5. Half-mask or full-face air-purifying respirators with HEPA filters shall be worn only during the preparation of the work area and final clean up procedures provided airborne fiber concentrations inside the work area are less than 0.1 f/cc.

6. Use of single use dust respirators is prohibited for the above respiratory protection.

D. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.

E. The Abatement Contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every six months thereafter with the type of respirator he/she will be using.

F. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.

G. No facial hair, which interferes with the face-to-mask sealing surface, shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.

H. Contact lenses shall not be worn in conjunction with respiratory protection.

I. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the Abatement Contractor at the Abatement Contractor's expense.

J. Respiratory protection maintenance and decontamination procedures shall meet the following requirement:

1. Respiratory protection shall be inspected and decontaminated on a daily basis in accordance with OSHA 29 CFR 1910.134(b); and

2. HEPA filters for negative pressure respirators shall be changed after each shower; and

3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures; and

4. Airline respirators with HEPA filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator facepieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers' recommendations; and

5. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted; and

6. Organic solvents shall not be used for washing of respirators.

K. No visitors shall be allowed to enter the contaminated area if they do not have their medical certification and training certificate. Authorized visitors shall be provided with suitable PAPR respirators and instructions on the proper use of respirators whenever entering the work area.

3.16 DISPOSAL OF WASTE

A. APPLICABLE REGULATIONS

1. All asbestos waste shall be stored, transported and disposed of as per, but not limited to, the following Regulations:

a. NYS Code Rule 56

b. U.S. Department of Transportation (DOT)
Hazardous Substances
Title 29, Part 171 and 172 of the code of Federal Regulations
regarding waste collector registration

c. Regulations regarding waste collector registration Title 6, part 364 of the New York State Official Compilation of Codes, Rules and Regulations – 6 NYCRR 364

d. USEPA NESHAPS 40 CRF 61

e. USEPA ASBESTOS WASTE MANAGEMENT GUIDANCE EPA/530-SW-85-007

B. TRANSPORTER OR HAULER - The Abatement Contractor shall bear full responsibility for proper characterization, transportation and disposal of all solid or liquid waste, generated during the project, in a legal manner. The Owner shall approve all transportation and disposal methods.

1. The Abatement Contractor's Transporter (hauler) and disposal site shall be approved by the Owner. The Abatement Contractor shall remove within 48 hours all asbestos waste from the site after completing the clean up.

2. The Transporter must possess and present to the Owner’s representative a valid New York State Department of Environmental Conservation Part 364 asbestos hauler’s permit to verify license plate and permit numbers. The Owner’s representative will verify the authenticity of the hauler’s permit with the proper authority.

3. The Abatement Contractor shall give 24 hour notification prior to removing any waste from the site. All waste shall be removed from site only during normal working hours. No waste may be taken from the site without authorization from the Owner’s representative.

4. The Abatement Contractor shall have the Transporter give the date and time of arrival at the disposal site.

5. The Transporter with the Abatement Contractor and Owner’s consultant shall inspect all material in the transport container prior to taking possession and signing the Waste Manifest. The Transporter shall not have any off site transfers or be combined with any other off-site asbestos material.

6. The Transporter must travel directly to the disposal site with no unauthorized stops.

C. WASTE STORAGE CONTAINER

1. During loading and on site storage, the asbestos waste container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

2. The NYS DEC Hauler's Permit number shall be on both sides and back of the container.

3. The Container will not be permitted to leave the site without the proper signage.

4. A copy of the completed waste manifest shall be forwarded directly to the Owner's Consultant by the disposal facility.

5. Packaging of Non-friable Asbestos. Use of an open top container shall require written request, by the Contractor, and written approval by the Owners Representative, and be performed in compliance with all applicable regulations.
   a) A chute, if used, shall be air/dust tight along its lateral perimeter and at the terminal connection to the dumpster at ground level (solid wall and top container). The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.

   b) The container shall be lined with a minimum of two (2) layers of 6 mil. Fire-retardant polyethylene draped loosely over the sides so as to facilitate being wrapped over the top of the load and sealed prior to transport from the site.

   c) Prior to transport from the work site the Dumpster will be disconnected from the chute and sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

6. Packaging Friable Asbestos.

   a)The container shall be a solid wall, hard top and lockable container.

   b) The container shall be locked upon arrival at the site to restrict access. Security shall be provided at the entrance to the container during the loading process and immediately locked upon completion.

   c)The interior walls, floor and ceiling shall be lined with two (2) layers of 6 mil. Fire-retardant polyethylene.

   d) The waste shall be loaded in such a manner as to protect the integrity of the individual waste packages.

   e)Prior to transport from the work site the interior of the Dumpster will sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

D. WASTE DISPOSAL MANIFEST

1. The Asbestos Waste Manifest shall be equivalent to the "Waste Shipment Record" included in 40 CFR 61. A copy of the Contractor's manifest shall be reviewed by the Owner's Consultant and shall be the only manifest used.

2. The Manifest shall be verified by the Owner's Consultant indicating that all the information and amounts are accurate and the proper signatures are in place.

3. The Manifest shall have the signatures of the Abatement Contractor and the Transporter prior to any waste being removed from the site.

4. The Manifest shall be signed by the Disposal Facility owner or operator to certify receipt of asbestos containing materials covered by the manifest.

5. A copy of the completed manifest shall be provided by the Abatement Contractor to the Owner's Consultant and remain on site for inspection.

6. Abatement Contractor shall maintain a waste disposal log which indicates load number, date and time left site, container size, type of waste, quantity of waste, name of hauler, NYS DES permit number, trailer and tractor license number, and date manifest was returned to Consultant.

7. The Disposal Facility owner or operator shall return a signed copy of the Waste Manifest directly to:

North Rockland CSD
65 Chapel Street
Garnerville, New York 10923
ATTN: Paul B. Rooney

8. Copies of the completed Waste Manifest are to be sent by the disposal facility to the Hauler and Abatement Contractor.

9. Submit signed dump tickets and manifests with final payment request.

10. Final payment request will not be honored without signed dump ticket or manifests accounting for all asbestos waste removed from the site.

E. VIOLATIONS OF SPECIFICATIONS

1. Violations of the safety, hygiene, environmental, procedures herein, any applicable federal, state of local requirement s or failure to cooperate with the Owner's representative shall be grounds for dismissal and/or termination of this contract.

F. VIOLATIONS OF NO SMOKING POLICY

1. The Federal Pro Children Act of 1994 prohibits School District Officials from smoking in any buildings or on the grounds that is property of the School District. The District shall be considered smoke free. The School District strongly enforces its' No Smoking Policy. It is the Contractor's responsibility to inform all workers of this policy. Any worker(s) involved with this project that are found smoking or using tobacco products will be informed that they are in violation of the Federal and State Law and School Board Policy and will be removed from site.

3.17 LOCATION OF "ABATEMENT WORK"

(Please see attached Drawings for approximate locations)

1) NORTH ROCKLAND HIGH SCHOOL (INTERIOR ABATEMENT)

- Abatement Contractor responsible for complete removal and disposal of approximately 3,336 SF of sheetrock ceilings with friable asbestos-containing joint compound, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - MiniGym 514 (1414 SF)
  - Phys. Ed. Office 514A (168 SF)
  - Restroom 514B (51 SF)
  - Phys. Ed. Storage 514C (245 SF)
  - MiniGym 514F (1458 SF)

- Abatement Contractor responsible for complete removal and disposal of approximately 168 SF of non-friable asbestos-containing floor tiles, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - Phys. Ed. Office 514A (168 SF)

- Abatement Contractor responsible for complete removal and disposal of approximately 30 SF of fiberglass duct insulation with non-friable asbestos-containing pin mastic, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - Phys. Ed. Storage 514E (30 SF)

2) NORTH ROCKLAND HIGH SCHOOL FIELDHOUSE (INTERIOR ABATEMENT)

- Abatement Contractor responsible for complete removal and disposal of approximately 675 SF of non-friable asbestos-containing transite walls/ceilings, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - Athletic Storage 2 (75 SF)
  - Men's Restroom 3 (300 SF)
  - Women's Restroom 4 (300 SF)

- Abatement Contractor responsible for probing of wet walls within identified areas and responsible for complete removal and disposal of approximately 50 LF of friable presumed asbestos-containing pipe insulation and/or mudded joint packing (elbows), as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - Athletic Storage 2 (20 LF)
  - Men's Restroom 3/Women's Restroom 4 (30 LF)

3) NORTH ROCKLAND HIGH SCHOOL FIELDHOUSE (EXTERIOR ABATEMENT)

- Abatement Contractor responsible for complete removal and disposal of approximately 45 LF of non-friable asbestos-containing window glazing, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - Men's Restroom 3 (15 LF)
  - Women's Restroom 4 (30 LF)

END OF LOCATION OF WORK

3.18 GENERAL

A. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to: ceiling tiles, ceiling finishes, wall finishes, floor finishes, etc.

B. The Abatement Contractor shall be responsible for all demolition required to access materials identified in scope of work and on associated drawings.

C. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. Additional asbestos abatement performed prior to the order to proceed will not be acknowledged.

D. The Abatement Contractor shall remove asbestos-containing floor covering to the building substrate beneath; in areas indicted. Subsequent to final air clearance the substrate shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.

E. Power tools used to drill, cut into or otherwise disturb asbestos containing material shall be equipped with HEPA filtered local exhaust ventilation.

F. The Abatement Contractor shall provide access to GFCI electrical power, required to perform the area air monitoring for this project, within and immediately adjacent to each work area.

G. Unwrapped or unbagged ACM shall be immediately placed in an impermeable waste bag or wrapped in plastic sheeting.

H. Coordinate all removal operations with the Owner.

Asbestos Employee Medical Examination Statement

Certificate of Worker Release
Asbestos Employee Training Statement
CERTIFICATE OF WORKERS'S ACKNOWLEDGEMENT

PROJECT NAME: **North Rockland CSD: North Rockland High School Projects – Phase 1**

CONTRACTOR'S NAME:_____

WORKING WITH ASBESTOS INVOLVES POTENTIAL EXPOSURE TO AIRBORNE ASBESTOS FIBERS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER AND RESPIRATORY DISEASES. SMOKING CIGARETTES AND INHALATION OF ASBESTOS FIBERS INCREASES THE RISK THAT YOU WILL DEVELOP LUNG CANCER ABOVE THAT OF THE NON-SMOKING PUBLIC.

The Contract for this project requires your employer to 1) supply proper respiratory protection devices and training on their use 2) provide training on safe work practices and on use of the equipment used on the project 3) provide a medical examination meeting the requirements of 29 CFR 1926.1101. Your signature on this certificate, documents that your employer has fulfilled these contractual obligations and you understand the information presented to you.

************DO NOT SIGN THIS FORM UNLESS YOU FULLY UNDERSTAND THIS INFORMATION*********

RESPIRATORY PROTECTION: I have been trained in the proper use and limitations of the type of respiratory protection devices to be used on this project. I have reviewed the written respiratory protection program manual and a copy is available for my use. Respiratory protection equipment has been proved, by the Contractor, at no cost to me.

TRAINING COURSE: I have been trained in the risks and dangers associated with handling asbestos, breathing asbestos dust, proper work procedures, personal protection and engineering controls. I have satisfactorily completed and Asbestos Safety Training Program for New York State and have been issued a New York State Department of Health Certificate of Asbestos Safety Training.

MEDICAL EXAMINATION: I have satisfactorily completed a medical examination within the last 12 months that meets the OSHA requirement for an asbestos worker and included at least 1) medical history 2) pulmonary function 3) medical examination 4) approval to wear respiratory protection devises and may have included an evaluation of a chest x-ray.

Signature:_____Date_____

Printed Name:_____SS#:_____

Witness:_____Date:_____

North Rockland CSD: North Rockland High School Projects – Phase 1

ESTIMATE OF ACM QUANTITIES

****

EACH ABATEMENT CONTRACTOR SHALL READ AND ACKNOWLEDGE THE FOLLOWING NOTICE. A SIGNED AND DATED COPY OF THIS ACKNOWLEDGMENT SHALL BE SUBMITTED WITH THE ABATEMENT CONTRACTOR'S BID FOR THIS PROJECT. FAILURE TO DO SO MAY, AT THE SOLE DISCRETION OF THE OWNER, RESULT IN THE BID BEING CONSIDERED NON-RESPONSIVE AND RESULT IN DISQUALIFICATION OF THE ABATEMENT CONTRACTOR'S BID ON THIS PROJECT.

****

***** NOTICE *****

The linear and square footages listed within this specification are approximates. Abatement Contractor is required to visit the work locations prior to bid submittal in order to take actual field measurements within each listed location. The Abatement Contractor shall base their bid on actual quantities determined, by them, at the site walkthrough. Estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project.

****

Acknowledgment: I have read and understand the above **NOTICE** regarding removal quantity estimates and understand that estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project. The Abatement Contractor's signatory represents to the Owner that he/she has the authority of the entity he/she represents to sign this agreement on its behalf.

Company Name: _____
Type or Print

BY: _____ _____ _____
Signature Title Date

Print Name: _____

ASSOCIATED ASBESTOS REMOVAL LOCATION DRAWINGS

- ***North Rockland CSD: North Rockland High School Projects – Phase 1***

  - **AA-000** – General Asbestos Abatement Notes
  - **AA-100** – North Rockland High School – Weight Room Asbestos Abatement Plan
  - **AA-200** – North Rockland High School – Fieldhouse Asbestos Abatement Plan

END OF SECTION 020800

SECTION 024113 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Demolition of existing site improvements
B. Disposal of demolition debris
C. Backfilling and grading of demolished areas

1.02 RELATED SECTIONS

A. Section 015000 – Construction Facilities, Temporary Controls and Maintenance
B. Section 311001 – Earthwork-Site Work
C. Section 312500 – Erosion and Sediment Control
D. Section 329200 – Turf and Grasses

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Quality Control Submittals

1. Permits: Submit one copy of each permit required for the demolition work required to the Owner's Representative.
2. Demolition Plan: For information only, submit one copy of the demolition plan to the Owner's Representative and the Project Designer as required under the "Quality Assurance" article below.

1.04 QUALITY ASSURANCE

A. Permits: Prior to starting demolition work outlined as part of this section, obtain all permits required by Federal, State and/or local jurisdictions for all phases and operations of the work.

B. Demolition Plan: Prior to starting demolition work outlined as part of this section, the contractor shall prepare a detailed demolition plan. The demolition plan shall include, but is not limited to, the detailed outline of intended demolition and disposal procedures. The demolition plan will not relieve the Contractor of complete responsibility for the successful performance of the work in accordance with all Federal, State and local codes and restrictions.

1.05 PROJECT CONDITIONS

A. Recycling: The Contractor shall recycle demolition debris to the greatest extent possible.

B. Burning: The Contractor is prohibited from burning demolition materials on the project site.

C. Explosives: The Contractor is prohibited from using explosive materials on the project site.

D. Utility Location: Verify the location and status of all utilities within the contract limit line prior to beginning demolition work.

E. Utility Protection: Protect existing utilities scheduled to remain while work required as part of this section is being performed. Do not interrupt utility services to adjacent buildings or other site improvements.

F. Utility Disconnection: Disconnect utilities as required. Coordinate and pay for all work with applicable utility companies.

G. Site Maintenance: Keep streets, sidewalks and adjacent site areas clean and free from debris at all times.

H. Storm Drainage: Maintain street and site drains open for free drainage. Install temporary measures as required to prevent silt and debris from entering storm runoff leaving the site.

I. Objectionable Noises: Limit the use of air hammers, and other excessively noisy equipment as much as is practical. Conform to local governing requirements.

J. Area Safety: Employ watchpersons to patrol the site 24 hours per day, 7 days per week from the time demolition has started until the site can be secured in a safe manner.

1.06 SEQUENCING AND SCHEDULING

A. Proceed with and complete demolition operations as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Plugs, Caps, Flanges: Approved cast iron materials unless specifically noted otherwise on the Contract Documents.

B. Grout: Material complying with ASTM C 476.

C. On-Site Backfill Material: Acceptable on-site fill material approved by the Owner's Testing Agency or the Project Designer for use as backfill in locations where backfill material is not otherwise specified, free of stones larger than 6", roots, organic matter, construction debris, trash or other deleterious matter.

D. Backfill Material: Where indicated supply well-graded granular soil that meets the general gradation requirements for New York State Department of Transportation (NYSDOT) Type 2 Aggregate subbase (Item 304.12), gradation and material requirements specified below:

Sieve	Percent Passing
Sieve Size	
2 inch	100
1/4 inch	25-60
No. 40	5-40
No. 200	0-10

PART 3 EXECUTION

3.01 EXAMINATION

A. Demolition Contractor Verification of Conditions: Examine conditions under which site demolition work is to be accomplished with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Demolition Contractor confirms conditions as being acceptable to ensure proper and timely completion of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Temporary Fencing: Install temporary chain link fencing, including access gates around the demolition area prior to starting work specified in this section. Remove temporary fence in its entirety, including all anchorage materials upon completion of backfill operations.

3.03 DEMOLITION

A. Perform demolition in a systematic manner.

B. Remove walks, roads, pavements, curbs, slabs on grade, fences and other site improvements with the contract limit line, unless specifically indicated or directed otherwise.

3.04 DISPOSAL

A. Remove demolition debris and any excess fill from the project site as soon as practical.

B. Do not store, sell or burn materials on the project property.

3.05 BACKFILLING AND GRADING

A. Place fill in basements and other voids within the contract limit line. Broken concrete and masonry shall not be used as fill on the site unless specifically indicated as being acceptable on the Drawings.

B. Rough grade backfill to the contour indicated on the drawings. If no contour information is provided, grade the area to provide positive drainage.

C. Install a minimum of 6” of topsoil over backfilled areas. Finish grade the surface to be free of depressions that will trap water and seed the entire area.

END OF SECTION 024113

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SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.

B. Related Requirements:

1. Section 011000 "Summary" for use of the premises and phasing requirements.
2. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before building demolition.
3. Section 024119 "Selective Demolition" for partial demolition of buildings, structures, and site improvements.
4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store. Include fasteners or brackets needed for reattachment elsewhere.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site .

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to Owner.

1.5 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property , for environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Building Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping of utility services.

1.6 CLOSEOUT SUBMITTALS

1.7 QUALITY ASSURANCE

1.8 FIELD CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. On-site storage or sale of removed items or materials is not permitted.

1.9 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

2.2 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

D. Inventory and record the condition of items to be removed and salvaged.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Utilities to Be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.

1. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
2. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
3. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

C. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least 24 hours after flame-cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely .

D. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.

3.6 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.9 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.
3. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse .

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site .

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property , for environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

1.7 QUALITY ASSURANCE

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

1. Roofing System .

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings .

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch during and for at least 24 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 075113 Buit up asphalt roofing for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 028300 – LEAD SAFE WORK PRACTICES

PART 1 - GENERAL

1.1 DESCRIPTION/SCOPE OF WORK

A. The work covered by these specifications shall consist of furnishing all labor, materials, tools, and equipment necessary to control and mitigate potential lead-based paint (LBP) hazards during demolition/renovation activities pertaining to the ***North Rockland High School Projects – Phase 1.***

The following is a detailed listing of identified Lead-based Paint(s) and/or Lead-containing Material(s), above the EPA action level of 1.0 mg/sq. cm.:

TABLE I: IDENTIFIED LEAD-BASED PAINT
NORTH ROCKLAND HIGH SCHOOL PROJECTS
PHASE 1

Location	LBP Component	Substrate	Color	LBP Condition
HIGH SCHOOL				
Weight Room Office, Wall, 4”	Cove Base Molding	Vinyl	Beige	Fair
Weight Room Office Bathroom, Wall	Wall Base	Ceramic	Beige	Fair
Weight Room Shower Storage, Wall	Wall Base	Ceramic	Beige	Fair
East Weight Room Storage, Exterior Door	Lintel	Metal	Brown	Fair
Weight Room Storage Area, Wall	Wall Base	Ceramic	Beige	Fair
Trainer’s Room (Former Locker Room), Wall	Support Beam	Metal	White	Fair
It should be noted that several components tested did in fact contain minimal lead-levels below the EPA threshold level of 1.0 mg/sq. cm for classification as Lead-Based Paint (LBP) and are considered lead-containing coatings by the OSHA Regulation, “Lead Exposure in Construction” (29 CFR 1926.62). OSHA does not recognize a minimum limit for lead concentration in paint for the purpose of disturbance. Monitoring of workers performing demolition/cleaning/disturbance of painted surfaces shall be completed to document personnel occupational exposure. Items containing any amount of lead concentration are considered lead-containing coatings per 29 CFR 1926.62, OSHA Lead Exposure in Construction.				

The work of this Contractor shall include the following, and shall be as required by specific work-related tasks and disturbance(s) of above-referenced Lead-based Paint(s) and/or Lead-containing Material(s), above the EPA action level of 1.0 mg/sq. cm:

1) Personnel air monitoring and analysis.

2) Waste characterization and classification.

3) Transportation/disposal off-site of LBP wastes/debris and lead-contaminated waste/debris generated from LBP disturbance(s).

B. Manual demolition, scraping and manual sanding of lead-based paint surfaces and power tool cleaning with dust collection systems shall be performed in conjunction with engineering and work practice controls meeting the requirements of 29 CFR 1926.62(e)(1).

C. Components with lead-based paint shall be removed intact to the extent practicable. A 6-mil polyethylene drop cloth shall be placed on either side of the component, prior to its removal, to catch any paint chips that may become dislodged. The component shall be wrapped in a layer of 6-mil polyethylene for movement to the disposal container. Follow proper disposal requirements. The area around the component removal shall be wet wiped and HEPA vacuumed, including the tent enclosure. The polyethylene sheeting shall be carefully folded in on itself and placed in a 6-mil disposal bag. Containment debris shall be properly disposed of as lead-based waste.

D. Chemical stripping should be used for LBP removal on surfaces that will be subjected to welding, cutting or torch burning. No chemical strippers containing methylene chloride shall be used by the Contractor on this project. Abrasive blasting, heat stripping, uncontained hydroblasting, welding, cutting or torch burning shall not be performed on surfaces where LBP is present. Abrasive blasting, heat stripping, uncontained hydroblasting, welding, cutting or torch burning shall only be performed on bare metal substrate.

E. The Contractor's use of a subcontractor shall not relieve the Contractor of full responsibility for the work to be performed.

F. If available, the Contractor may submit exposure assessment data obtained within the last twelve (12) months from previous jobs conducted under similar conditions, control methods, work practices and environmental conditions to be used in this contract. Other objective data may be used to demonstrate that work activities in this contract will not result in occupational exposures to airborne lead that exceeds the PEL. The assessment shall include comparable lead concentrations in coating materials, work practices, engineering controls and rates of work.

G. Until the exposure assessment is performed, the Contractor must provide to his workers the following: Respiratory protection with a minimum protection factor of 10, personal protective clothing, lead-free change areas, hand washing/shower facilities, biological monitoring and training per 29 CFR 1926.62.

This Specification shall be used as a Guideline for the use of Contractors who complete the demolition/renovation activities pertaining to the ***North Rockland CSD High School Athletic Site Improvements and Restrooms Project*** as detailed within Section #1.2 of this specification. The intent of this Specification is to remain in conformance with 29 CFR 1926.62 and to maintain an airborne concentration of lead-dust below the action level. This Specification is written in order to outline the worst-case scenario in regard to lead safe work practices. However, the work procedures section is written in a manner, which outlines the requirements that should be necessary, at a minimum, to maintain an airborne concentration of lead dust below the action level.

H. The Contractor shall ensure that any HVAC equipment intakes within and around the work areas are protected by shutting down the units and/or installing HEPA filters over the intake. The Contractor shall coordinate rebalancing of the HVAC equipment prior to installing the HEPA filters. The Contractor shall alter the size and extent of the isolation barriers as necessary due to weather conditions, functional space use and density of building occupants in the vicinity, as required.

1.2 REGULATIONS & REFERENCE STANDARDS

A. General Requirements

All work of this section shall be conducted in strict accordance with all applicable Federal, State and Local regulations.

Matters of interpretations of the standards and regulations shall be submitted to the appropriate agency for resolution before starting work. Where these requirements vary the most stringent shall apply.

B. Specific Requirements

1. American National Standards Institute (ANSI)

a. ANSI Z9.2-79 – Fundamentals Governing the Design and Operation of Local Exhaust Systems.

b. Z88.2-80 – Practice for Respiratory Protection.

2. Title X - U.S. Department of Housing and Urban Development "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing."

3. Code of Federal Regulations (CFR)

a. 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response.

b. 29 CFR Part 1910.134 – Respiratory Protection.

c. 29 CFR Part 1910.146 – Confined Space Entry Program.

d. 29 CFR Part 1910.1025 – Lead.

e. 29 CFR Part 1910.1200 – Hazard Communication.
f. 29 CFR Part 1926.55 – Gases, Vapors, Fumes, Dusts and Mists.

g. 29 CFR Part 1926.57 – Ventilation.

h. 29 CFR Part 1926.62 – Lead (Construction Industry Standard).

i. 40 CFR Part 260 – Hazardous Waste Management Systems: General.

j. 40 CFR Part 261 – Identification and Listing of Hazardous Waste.

k. 40 CFR Part 262 – Generators of Hazardous Wastes.

l. 40 CFR Part 263 – Transporters of Hazardous Waste.

m. 40 CFR Part 264 – Owners and Operators of Hazardous Waste Treatment, Storage & Disposal Facilities.

n. 40 CFR Part 265 – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage & Disposal Facilities.

o. 40 CFR Part 268 – Land Disposal Restrictions.

p. 40 CFR Part 745 – Lead; Requirements for Lead-Based Paint Activities in Child Occupied Facilities

q. 40 CFR Part 745.90 – EPA's Renovation, Repair & Painting Rule.

r. 49 CFR Parts 170-178 – Department of Transportation Regulations.

4. New York Codes of Rules and Regulations (NYCRR)

a. 6 NYCRR Part 360 – Solid Waste Regulations.

b. 6 NYCRR Part 364 – Waste Transporter Permits.

c. 6 NYCRR Part 370-373 – Hazardous Waste Regulations.

d. 8 NYCRR Part 155 – Uniform Safety Standards for School Construction & Maintenance Projects.

5. Steel Structures Painting Council (SSPC)

a. SSPC-Guide 6 – Guide for Containing Debris Generated During Paint Removal Operations.

b. SSPC-Guide 7 – Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.

Preparation Debris.

6. Underwriters Laboratories. Inc. (UL)

a. UL 586 – High Efficiency, Particulate Air Filter Units.

1.3 DEFINITIONS

A. Abatement
For the purposes of this Specification, the term abatement shall refer to any procedure that impacts lead-based paint on any surface. Procedures can include: paint removal; whole removal of the surface (i.e. window replacement): demolition of painted surfaces; and clean-up of paint debris.

B. Action Level
Employee exposure without regard to use of respirators, to an airborne concentration of lead of thirty (30) micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, micrograms per cubic meter of air" refers to the action level. (Note: For longer exposure period lower action level is triggered).

C. Area Monitoring
Sampling of lead concentrations within the lead control area (work area) and inside the physical boundaries which is representative of the airborne lead concentrations that may reach the breathing zone of personnel potentially exposed to lead.

D. Physical Boundary
Area physically roped or partitioned off around a work area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."

E. Change Rooms and Shower Facilities
Rooms within the designated physical boundary around the work area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.

F. Decontamination Room
Room for removal of contaminated personal protective equipment (PPE).

G. Eight-Hour Time Weighted Average (TWA)
Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.

H. High Efficiency Particulate Air (HEPA) Filter Equipment
HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.

I. Lead Control Area
A work area within which engineering controls are implemented to prevent the spread of lead dust, paint chips or debris from lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent entry of unauthorized personnel.

J. Lead Permissible Exposure Limit (PEL)
Fifty (50) micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR Part 1926.62. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

K. Personal Monitoring
Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR Part 1926.62. Samples shall be representative of the employees work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders with a radius of 6 to 9 inches and the center at the nose or mouth.

L. Wipe Sampling
Clearance testing procedures, which determine the amount of existing lead-based paint surface dust by atomic absorption spectroscopy analysis, or inductively coupled plasma emission spectrometry expressed in micrograms of lead.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Contractor: Certification that the Contractor has prior experience on LBP activity projects similar in nature and extent to ensure the capability to perform the required work procedures in a satisfactory manner.

2. Competent Person: Certification that the Contractor's full-time onsite Competent Person meets the competent person requirements of 29 CFR Part 1926.62 and is experienced in administration and supervision of LBP activity projects, including work practices, protective measures for building and personnel, disposal procedures, etc. This person shall have completed a Contractor Supervisor LBP abatement course by an EPA Training Center or an equivalent certification course, and have had a minimum of 2 years on-the-job experience.

3. Testing Laboratory: The name, address, and telephone number of the independent testing laboratory selected to perform sampling and analysis for personal and area air samples and wipe samples, and TCLP analysis of LBP wastes and debris. Documentation that the laboratory performing the analysis is an EPA National Lead Laboratory Accreditation Program (NLLAP) accredited laboratory and that it is listed proficient in the NIOSH/EPA Environmental Lead Proficiency Analytical Testing Program (ELPAT), and a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory. Certification shall include accreditation for heavy metal analysis, list of experience relevant to analysis of lead in air, and a Quality Assurance and Quality Control Program. Currently, the American Association for Laboratory Accreditation (ASLA) and the American Industrial Hygiene Association (AIHA) are the EPA recognized laboratory accreditors. Documentation shall include the date of accreditation or reaccreditation.

4. Blood Lead Testing Laboratory: The name, address and telephone number of the blood lead testing laboratory; the laboratory's listing by OSHA and the U.S. Public Health Service Center for Disease Control (CDC); and documentation that the laboratory certified in the state where the work site is located.

B. Respiratory Protection Devices
Manufacturer's certification of NIOSH for respiratory protection devices utilized on the site.

C. Cartridges, Filters, and Vacuum Systems
Manufacturer's certification of NIOSH approval of respirator cartridges (organic vapor, acid gas, mist, dust, high efficiency particulate); High Efficiency Particulate Air (HEPA) filtration capabilities for all cartridges, filters, and HEPA vacuum systems.

D. Medical Examination and Records
Certification that employees who are involved in LBP abatement work have received medical examinations and will receive continued medical surveillance, including biological monitoring, as required by 29 CFR Part 1926.62, 29 CFR Part 910.1200, 29 CFR Part 1910.120 and by the state and local regulations pertaining to such work. Records shall be retained, at Contractor expense, in accordance with 29 CFR Part 1910.20.

1. Provide medical surveillance to workers until exposure monitoring reveals that workers are not exposed on any day of the job to airborne lead at or above the Action Level of 30 ug/dL of blood. This consists of a blood test measuring the level of lead and zinc protoporphyrin by a licensed physician. Further testing and medical exams may be necessary depending on the results of initial blood tests and/or the initial exposure assessment.

E. Training

Training certification shall be provided prior to the start of work involving LBP abatement, for all of the Contractors' workers, supervisors and Competent Person. Training shall meet the requirements of 29 CFR Part 1926.62, 29 CFR Part 1926.59, 29 CFR Part 1910.1200, 29 CFR Part 1910.120 and 49 CFR 172, and that required by EPA or the state LBP course for the work to be performed. Training shall be provided prior to the time of job assignment and, at least, annually. The project specific training shall. at a minimum, include the following.

1. Specific nature of the operation, which could result in exposure to lead.

2. Purpose, proper selection, fitting, use and limitations of respirators.

3. Purpose and description of the medical surveillance program and the medical removal protection program, including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females and hazards to the fetus and additional precautions for employees who are pregnant.)

4. Relevant engineering controls and good work practices.

5. The contents of any compliance plan in effect.

6. Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician.

7. The employee's right of access to records under 29 CFR part 1910.20.

F. Respiratory Protection Program

1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 12 months thereafter as required by 29 CFR Part1910.134 and 29 CFR Part 1926.62.

2. Establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR Part 1910.134 and 29 CFR Part 1926.62.

3. All workers are required to don an appropriate level of protection commensurate with the airborne concentrations of lead in which they are working. The level of protection will be determined by the Contractor, based on objective air monitoring data.

G. Licenses and Permits

Copies of licenses and permits as required by applicable Federal, state and local regulations shall be obtained before the start of the LBP project.

1.5 SUBMITTALS

A. The submittals shall be submitted in accordance with Specification Section 01300, Submittals.

B. Certifications

Prior to the start of work, submit required certifications, plans, programs, permits and licenses identified in Paragraph 1.5 of this specification section.

C. Equipment List

Prior to the start of work submit list of equipment items to be used in the work, including brand names, model, capacity, performance characteristics, quantities and other pertinent information.

D. Lead-Based Paint (LBP) Management Plan

The contractor shall prepare a detailed LBP Management Plan that identifies the work procedures, health and safety measures to be used in LBP work procedures; and that addresses spill prevention, containment and emergency response procedures. The plan shall address the methods to be undertaken to abate the lead to include the following key elements:

1. LBP containment methods to control employee exposure to lead at or below the permissible exposure limit and to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area.
2. Training requirements as required by Federal, state and local regulations.
3. Unique problems associated with the LBP project.
4. Sketch of location, size and details of LBP control areas, decontamination rooms/areas, change rooms and shower facilities.
5. Eating, drinking, smoking, and rest room procedures.
6. Sequencing of LBP related work.
7. Personnel protective equipment and respiratory protection program, including controls.
8. Engineering controls, containment structures and safety measures.
9. Worker exposure assessment procedures.
10. Work Practice controls.
11. Housekeeping.
12. Hygiene facilities and practice.
13. Medical surveillance, including medical removal procedures.
14. Sampling, testing and analytical methods to include personnel air sampling requirements of 29 CFR Part 1926.62, wipe sampling of the surface where the LBP was removed and, when required, toxicity characteristic leaching procedure (TCLP) testing of the waste material in accordance with 40 CFR 261 and 6 NYCRR Part 371, and area air sampling required by the specifications. Procedures must include frequency, locations, sampling and analytical methods to be used.

E. Compliance Program

Contractor's Compliance Program prepared in accordance with 29 CFR Part 1926.62 (e) (2).

F. Waste Transporter and Disposal Facility Permits, and Disposal Documents.

1. Name, address and telephone number of 6 NYCRR Part 364 transporter who will be transporting the LBP wastes and debris and a copy of the transporter's 6 NYCRR Part 364 permit.
2. Name, address and telephone number of disposal facility accepting the LBP wastes and debris and a copy of the permit from the disposal facility documenting the facility is permitted to accept the wastes being delivered.
3. Copy of completed waste characterization (waste profile) forms for obtaining approval to dispose of the LBP wastes and liquid wastes at the disposal facility.
4. Copy of the approved waste characterization (waste profile) forms from the disposal facility indicating they are permitted to accept the wastes and will accept the wastes being delivered.

5. Example of completed transportation and disposal documents (i.e., bill of lading or hazardous waste manifest and land disposal restriction notification forms, as applicable) prior to shipment of wastes.

6. Copy of the completed and signed transportation and disposal documents at time of shipment for the disposal of LBP wastes and debris, liquid wastes and any other wastes generated, and copy signed by the disposal facility.

7. Copy of certificate of destruction for incinerated wastes, certificate of treatment and/or certificate of disposal, as applicable and associated tracking documents from the final disposal facility for disposal of the LBP wastes and debris.

G. Health and Safety Plan And Confined Space Entry Program
Contractor's written site specific Health and Safety Plan prepared in accordance with 29 CFR Part 1910.120 and Contractor's confined space entry program prepared in accordance with 29 CFR Part 1910.146. These documents are requested for information only and as documentation that they exist.

H. Sampling and Laboratory Analysis Reports
Submit field sampling logs for all personal and area air samples, wipe samples and waste samples taken, and submit copy of laboratory analysis reports and chain of custody records for all sample analysis.

I. Competent person certification per Section 3.5.B.

1.6 POSTED WARNINGS & NOTICES

The following regulations, warnings and notices shall be posted at the work site in accordance with 29 CFR Part 1926.62.

A. Regulations
A copy of applicable Federal, state, and local regulations shall be maintained at the work site.

B. Warning Signs
Warning signs shall be provided at approaches to LBP control areas. Signs shall be located at a distance from the LBP control areas that will allow personnel to read the sign and take the necessary protective actions required before entering the LBP control area. The signs shall comply with the requirements of 29 CFR Part 1926.62.

C. Worker Information
Right-to-know notices shall be placed in clearly visible areas of the work site in compliance with Federal, State and Local regulations.

D. Air Monitoring Results
Daily air monitoring results shall be prepared in order to be easily understood by the workers and shall be placed in a clearly visible area of the work site.

E. Emergency Telephone Numbers
A list of telephone numbers shall be posted at the site. The list shall include numbers of the local hospital, emergency squad, police and fire departments, Government and Contractor representatives who can be reached 24 hours per day and professional consultants directly involved in the project.

1.7 EQUIPMENT & MATERIALS

Sufficient quantities of health and safety materials required by 29 CFR Part 1926.62, and other materials and equipment needed to complete the project, shall be available and kept on the site.

A. Respirators
Air-purifying respirators shall be approved by NIOSH for use with dust, fumes and mists having permissible exposure limits less than 0.05 milligrams per cubic meter (i.e., have high-efficiency particulate air (HEPA) filters) and for other hazardous airborne contaminants that may be encountered, as determined by the Competent Person. The Contractor shall furnish, at no cost to personnel/employee, respirators to provide protection from airborne concentrations of lead. Respirators shall comply with the requirements of 29 CFR Part 1926.62 and shall be used in accordance with 29 CFR Part 1926.62, 29 CFR Part 1926.103 and 29 CFR Part 1910.134.

B. Respirator Cartridges

A sufficient supply of respirator cartridges shall be maintained at the work site to provide new cartridges to employees and authorized visitors, throughout the duration of the project. Cartridges shall be replaced according to the manufacturer's recommendations, when breathing becomes difficult, or if the cartridge becomes wet.

C. Protective Clothing

1. The Contractor shall furnish, at no cost to personnel/employee, equipment/ clothing for protection from airborne and waterborne LBP debris. An adequate supply of these items shall be available for worker and authorized visitor use. Workers and visitors shall not take protective clothing and equipment off the work site at any time. Protective clothing includes:

   a. Coveralls (Whole Body Protective Coverings): Full-body coveralls and head covers shall be worn by workers in the work area as necessary. Sleeves shall be secured at the wrist and pants legs at the ankle with tape. Permeable clothing shall be provided in heat-stress conditions. Where non-disposable coveralls are provided, these coveralls shall be cleaned after each wearing. Cleaning of coveralls and other non-disposable clothing shall be in accordance with the provisions for cleaning in 29 CFR Part 1926.62.

   b. Boots: Work boots with nonskid soles or impermeable work boot covers shall be worn by workers. Where required by OSHA, safety boots (steel toe or steel toe and shank) shall be worn. Paint the uppers of boots red with waterproof enamel. Do not allow boots to be removed from the work area for any reason after being contaminated with LBP debris. Dispose of boots as LBP contaminated waste at the end of the work.

   c. Gloves: Inner gloves, appropriate for items and hazards encountered and disposable outer work gloves shall be provided to each worker and shall be worn while the worker is in the work area. Glove material shall be appropriate for the specific chemical exposure. Gloves shall not be removed from the work area and shall be disposed of as LBP contaminated waste at the end of the work.

   d. Hard Hats: Head protection (hard hats) shall be provided as required by OSHA for workers and authorized visitors. Protective plastic-strap suspension hats shall be used. Hard hats shall be worn at all times that work is in progress. Hats shall remain in the work area until the project is completed. Hats shall be thoroughly cleaned, decontaminated and bagged before being removed from the work area at the end of the project.

   e. Eye Protection: Fog-proof goggles for personnel engaged in LBP operations shall be worn when the use of a full-face piece respirator is not required.

D. Negative Air Pressure System

When a LBP control area requires the use of an airtight containment barrier, a negative air pressure system shall be used and pressure differential recordings taken. LBP shall not be removed from the LBP control area until the proper engineer controls and HEPA filtration systems are in place.

1. HEPA Filter Requirements

   The negative air pressure system shall be equipped with approved HEPA filters per UL 586. Negative air pressure equipment shall be equipped with new HEPA filters, and shall be sufficient to maintain a minimum pressure differential of minus *5* Pa (0.02 inch) of water column relative to adjacent, unsealed areas. Negative air pressure system minimum requirements are listed below.

   a. The unit shall be capable of delivering its rated volume of air with a clean first stage filter, an intermediate filter and a primary HEPA filter in place.

   b. The HEPA filter shall be certified as being capable of removing particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.

   c. The unit shall be capable of continuing to deliver no less than 70 percent of rated capacity when the HEPA filter is 70 percent full or measures 620 Pa (2.5 inches of water) static pressure differential on a magnehelic gauge.

d. The unit shall be equipped with a manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0 percent. The manometer shall be calibrated daily as recommended by the manufacturer. Record manually manometer readings of the pressure differential between the LBP control area and adjacent unsealed areas at the beginning of each workday and every 2 working hours thereafter.

e. The unit shall be equipped with a means for the operator to easily interpret the readings in terms of the volumetric flow rate of air per minute moving through the machine at any given moment.

f. The unit shall be equipped with an electronic mechanism that automatically shuts the machine off in the event of a filter breech or absence of a filter.

g. The unit shall be equipped with an audible horn that sounds an alarm when the machine has shut itself off.

h. The unit shall be equipped with an automatic safety mechanism that prevents a worker from improperly inserting the main HEPA filter.

i. The unit shall be ducted through the containment barrier wall to the outside of the work area. The unit shall not be exhausted into any work area.

2. Number of Units Required

The air within the containment barrier shall be changed at least once every 15 minutes by a continuously operating negative air pressure system, until the LBP control area barrier is removed. Filters shall be replaced as necessary to maintain the efficiency of the system. A back-up unit shall be maintained onsite.

3. Auxiliary Generator

An auxiliary generator shall be provided with a capacity adequate to power a minimum of 50 percent of the negative air machines at any time during the work. When power fails, the generator controls shall automatically start the generator and switch the negative air machine to generator power. The generator shall not present a carbon monoxide hazard to workers.

4. Discontinuing Negative Air Pressure System

The negative air pressure system shall not be shut down during LBP work unless authorized by the Owner's Consultant. At the completion of the LBP work procedures and disposal project, units shall be run until full cleanup has been completed and wipe clearance samples have been collected, analyzed and have passed final clearance testing requirements. Dismantling of the negative air pressure systems shall conform to the written decontamination procedures. Prefilters shall be removed and properly disposed. The intake to the machines shall be sealed with polyethylene to prevent environmental contamination.

E. Expendable Supplies

1. Polyethylene Sheet and Bags - General

Polyethylene sheet and bags shall be minimum 6-mil thick. Bags shall have pre-printed labels, and 5-inch (minimum) long plastic ties, pointed and looped to secure the filled bags. Polyethylene sheets shall be in roll sizes to minimize seams.

2. Polyethylene Sheet - Flame Resistant

Where a potential for fire exists, flame-resistant polyethylene sheets shall be provided. Polyethylene film shall conform to the requirements of NFPA 701.

3. Polyethylene Sheet - Reinforced

Reinforced polyethylene sheet shall be provided where high skin strength is required such as where it constitutes the only barrier between the LBP control area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between two layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

4. Tape and Adhesive Spray
Tape and adhesive shall be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive shall retain adhesion when exposed to wet conditions, including amended water. Tape shall be minimum 2 inches wide, industrial strength.

5. Containers
DOT approved impermeable containers shall be used to receive and retain LBP waste and debris, and lead contaminated material until disposal. Containers shall be labeled in accordance with EPA, DOT and OSHA standards.

6. Chemicals
Chemicals, including caustics and paint strippers, shall be properly labeled and stored in leak-tight containers.

F. Vacuum Systems
HEPA filtered vacuum systems shall be used during LBP operations which generate dust. The systems shall be suitably sized for the project, and filters shall be capable of removing particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.

G. Heat Blower Guns
Heat blower guns shall be flameless, electrical, paint-softener type with controls to limit temperature to 590 degrees C (1,100 degrees F). Heat blower shall be DI (non-grounded) 120 Vac, and shall be equipped with cone, fan, glass protector and spoon reflector nozzles.

H. Chemical Paint Strippers
Chemical paint strippers shall contain no methylene chloride.

I. Chemical Paint Stripper Neutralizer
Neutralizers for paint strippers shall be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

1.8 STORAGE OF MATERIALS

Materials shall be stored in a place and manner, which protects them from damage and contamination. During periods of cold weather, plastic materials shall be protected from the cold. Regularly inspect materials to identify damaged or deteriorating items. Damaged or deteriorated items shall not be used and shall be removed from the site as soon as they are discovered. Stored materials shall not present a hazard or an inconvenience to workers, visitors and/or other employees.

PART 2 – PRODUCTS

(NOT APPLICABLE)

PART 3 – EXECUTION

3.1 WORK PROCEDURES

LBP work procedures and related work shall be performed in accordance with the U.S. Department of Housing and Urban Development “Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing” and the accepted Contractor’s LBP Management Plan. Procedures and equipment required to limit occupational and environmental exposures to lead during LBP removal shall be in accordance with 29 CFR Part 1926.62 and as specified herein. LBP waste and debris, lead contaminated debris and personal protective clothing and equipment shall be disposed of in compliance with Federal, state, and local regulations.

A. Personnel Protection Procedures

Personnel shall wear and use protective clothing and equipment as specified and required by 29 CFR Part 1926.62 and 29 CFR Part 1910.120. Eating, smoking, drinking, chewing tobacco and chewing gum, and applying makeup shall not be permitted in the LBP control area. Personnel of trades not engaged in the LBP work procedures and disposal of LBP shall not be exposed at any time to airborne concentrations of lead equal to or in excess of 30 micrograms per cubic meter of air. Electrical service shall be disconnected when wet removal is performed, and temporary electrical service protected by a ground fault circuit interrupter shall be provided.

B. Safety and Health Procedures

The Competent Person shall be present on the work site throughout the LBP project to supervise, monitor and document the project's health and safety provisions. A daily log shall be maintained showing the results of sampling tests throughout the project area. LBP work being conducted within a LBP Control area where an airtight barrier is required shall be stopped if measured airborne lead concentrations, collected during LBP work procedures, exceed the pre- LBP work procedures airborne concentration levels.

C. Safety and Health Responsibilities

The Competent Person shall:

1. Verify that training meets applicable requirements.

2. Review and approve LBP Management Plan for conformance to the applicable referenced standards.

3. Inspect LBP removal work for conformance with the accepted LBP Management Plan.

4. Ensure that worker exposure air monitoring activities are in accordance with 29 CFR Part 1926.62.

5. Ensure work is performed in strict accordance with specifications.

6. Ensure hazardous exposure to personnel and to the environment are adequately controlled.

7. The Contractor's Competent Person shall be responsible for directing personal air monitoring.

8. The Owner's Consultant shall be responsible for directing area and final air/wipe testing.

D. Medical Surveillance Procedures

Medical surveillance shall be implemented in accordance with the accepted Contractor's LBP Management Plan, and shall comply with the requirements of 29 CFR Part 1926.62, including the provisions for biological monitoring, medical removal, protection and a physician's written opinion, signed by the physician performing the employee examination. The Contractor shall provide a copy of the written opinion for Contractor's employees prior to each employee's commencement of work.

E. Engineering Controls and Containment Structures

Engineering and work practice controls are the primary means of maintaining exposures to lead below the PEL. Paint removal and surface preparation activities must keep dust levels at a minimum. Torch cutting of surfaces with LBP will require appropriate personal protective equipment and exposure controls. Power tools must be equipped with vacuum shrouds including a high efficiency particulate air filtered vacuum system attached.

1. LBP Control Area

The LBP control area is where LBP work procedures occur and as such shall be considered contaminated. The LBP control area shall be isolated to prevent LBP containing dust or debris from passing into adjacent open areas. The control area shall be decontaminated at the completion of the LBP work procedure and disposal work.

2. Boundary Requirements.

Physical boundaries shall be provided around exterior LBP control areas by roping off the area indicated in the LBP Management Plan.

3. Control Barriers

The LBP control area shall be designated and separated from other outside areas with control barriers. The polyethylene sheeting shall have all openings masked and sealed. The LBP control area shall be erected according to the Contractors LBP Management Plan. Polyethylene sheeting shall be mechanically supported, independent of duct tape or spray adhesive.

4. Masking and Sealing

a. Exterior LBP control area requirements: Where the construction of a contained LBP control area is impractical or not required based on the method of lead work procedures, a roped-off perimeter shall be installed 20 feet from and around the area where the LBP handling procedures are performed and other requirements for LBP control areas shall be maintained. Personal monitoring of airborne concentrations shall be conducted in adjacent areas during the work shift, in accordance with 29 CFR Part 1926.62. Area air monitoring inside and outside of the roped-off perimeter shall be conducted as specified. Airborne concentrations shall not exceed specified levels.

5. Personnel Decontamination Unit

Personnel decontamination units shall be provided when required for the LBP procedures. Materials fabricated or delivered to the site before the shop drawings have been returned to the Contractor will be subject to rejection by the Owner's Consultant. Specifications and drawings of portable prefab units, such as a trailer unit, if utilized, must be submitted for review and approval before start of construction. Submittal shall include, but not be limited to, a floor plan layout showing dimensions, materials, sizes, thickness, plumbing, and electrical outlets. Access between contaminated and uncontaminated areas shall be through an airlock. Access between any two rooms or room and trailer within the decontamination unit shall be through a plastic sheeting curtained doorway. A separate equipment decontamination unit shall be provided. Each work area shall have an emergency exit. The personnel decontamination unit's clean room shall be the only means of entrance and exit, except for emergencies, from the LBP control area. Materials shall exit the LBP control area through the equipment decontamination area.

6. Clean Room

The clean room shall have only one exit to non-contaminated areas of the site. An airtight seal shall be constructed of polyethylene between the clean room and uncontaminated areas. Surfaces of the clean room shall be protected with sheet polyethylene. A temporary unit with a separate equipment decontamination locker room and a clean locker room shall be provided for personnel who are required to wear whole body protective clothing. One locker shall be provided in each locker room for each LBP worker, and each Contractor's representative. Lead-free personal clothing and shoes shall be kept in the clean locker. Hand wash station/showers shall be located between the equipment decontamination locker room and the clean locker room, and employees shall wash or shower before changing into personal clothes. An adequate supply of clean disposable towels shall be provided. LBP contaminated work clothing shall be cleaned. Clean rooms shall be physically attached to the LBP control area for areas inside the building but may be directly adjacent to the LBP control area outside of the building. Joint use of this space for other functions, such as offices, equipment storage, etc., is prohibited.

7. Hand Wash Station/Shower Room

An operational shower and hand washing station shall be provided between the work area and the clean changing room. Workers shall wash and/or shower before entering the clean changing room. Shower room shall be separated from other rooms by air-tight walls fabricated from polyethylene sheeting. Water shall be hot and cold or warm. Shower heads/ controls, soap dish, continuing supply of soap, and clean towels shall be provided. The shower shall be maintained in a sanitary condition. Waste water shall be pumped to drain and through waste water filters that meet state and/or local requirements. These filters shall be located inside the shower unit and filters shall be changed regularly. Spent filters shall be discarded as LBP contaminated waste.

8. Equipment Decontamination
The Equipment Decontamination Unit shall be used for removal of equipment and materials from the LBP control area, and shall include a wash room, holding room, and an enclosed walkway. The unit shall be constructed from wood framing material and polyethylene sheeting. Workers shall not enter or exit the LBP control area through the Equipment Decontamination Unit. A washdown station, consisting of an enclosed shower unit, shall be located in the work area outside the Wash Room. The washdown station shall be used to clean equipment, bags and containers. Bagged or containerized LBP wastes shall be passed from the work area and cleaned in the Wash Room. The Wash Room shall be separated from the work area by a polyethylene sheet flap. Wastewater shall be filtered and filters shall be changed as required for the shower unit and the Wash Room. Filters shall be disposed of as LBP contaminated wastes. The Holding Room shall be used as a drop location for bagged LBP passed from the Wash Room. This room shall be constructed so that bagged materials cannot be passed from the Wash Room through the Holding Room to the enclosed walkway. The walkway shall provide access to the Holding Room from outside the work area. The enclosed walkway shall be separated from the exterior by a single flap of polyethylene sheeting. The Contractor's equipment used for LBP work procedures shall be decontaminated prior to its removal outside of the lead control area. The decontamination water shall be containerized, the containers labeled, the liquid sampled and analyzed in the laboratory for lead, and properly disposed of off-site according to applicable Federal, State and Local regulations. See Paragraph 3.5.C.2.

9. Maintenance of Decontamination Units
Barriers and polyethylene sheeting shall be effectively sealed and taped. Containment barriers shall be visually inspected at the beginning of each work period. Damaged barriers and defects shall be immediately repaired upon discovery. Smoke testing methods shall be used to test effectiveness of barriers when directed by the Owner's Consultant.

10. LBP Control Area Exiting Procedures
Personnel exiting a LBP control area shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

a. HEPA vacuum all protective clothing before removing.

b. Remove protective clothing in the decontamination room and place this clothing in an approved impermeable disposal bag.

c. Wash or shower.

d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated work site.

F. Temporary Utilities

1. Temporary equipment as necessary to provide adequate power, light, heat, and water shall be installed, as needed, to accomplish the LBP operations properly and safely. The Contractor shall maintain the security and maintenance of the utility system in the LBP control areas. In the event of a failure of any utility system, the Owner will not be responsible for any loss of time or other expense incurred by the Contractor. In addition to any site-specific temporary utility requirements, the Contractor shall provide:

a. Back-flow protection on all water connections is required. Fittings installed by the Contractor shall be removed after completion of work with no damage or alteration to existing water piping and equipment.

b. When applicable, heavy-duty abrasion-resistant hoses to provide water to each work area and decontamination area.

c. A hot water heater, if necessary, to provide warm water to the decontamination showers.

d. Electrical service to work areas. Electrical service shall comply with National Electric Code, State and Local requirements and UL standards. Warning signs shall be posted at power outlets, which are other than 110-120 volt power. Only grounded extension cords shall be used. Incandescent lamps and light fixtures shall be of adequate wattage to provide good illumination in LBP control areas.

e. Temporary heating units, when needed, that have been tested and labeled by UL, FM, or another recognized trade association related to the fuel being consumed. Forced air or fan type units shall not be utilized inside a work area. Units shall have tip-over protection.

f. Sufficient quantity of single-occupant, self-contained chemical toilets, properly vented and fully enclosed.

3.2 LEAD-BASED PAINT WORK PRACTICES (Use methods as applicable)

A. Component Removal:

Components shall be removed intact to the extent practicable. A 6-mil polyethylene drop cloth shall be placed on either side of the component, prior to its removal, to catch any paint chips that may become dislodged. The component shall be wrapped in a layer of 6-mil polyethylene for movement to the disposal container. Follow proper disposal requirements. The area around the component removal shall be wet wiped and HEPA vacuumed, including the tent enclosure. The polyethylene sheeting shall be carefully folded in on itself and placed in a 6-mil disposal bag. Containment debris shall be properly disposed of as lead-based waste.

Clearance will be performed as follows:

1. Visual Clearance - Determine that all required work has been completed.
   Look for settled dust, paint chips or debris in work area. If located, cleanings will commence until visual inspection locates no evidence of dust.

2. The Owner's Consultant shall perform Dust and/or Soil Sampling as outlined in the U.S. Department of Housing and Urban Development "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing".

B. Chemical Stripping: Assumed Exposure (50 ug/m^3 - 500 ug/m^3)

Chemical stripping, using an agent approved by the Owner's Consultant, followed by wet scraping is the preferred method of abatement for areas where torch cutting, welding and/or other hot-work will affect building components coated with lead-based paint or lead containing coatings. The specific stripping agent(s) proposed must be approved by the Owner. No chemical strippers containing methylene chloride shall be used by the Contractor on this project.

1. Horizontal surfaces directly below and at least 10' in a radial direction from the area where chemical stripping is to be performed shall be protected with 6-mil poly.

2. All LBP on specified surfaces shall be removed to the bare substrate. The job is not considered complete until the substrate is dry and free of paint, debris, and LBP residue.

3. LBP stripping agents shall be brushed or troweled on the designated surfaces, or otherwise applied in accordance with manufacturer's specifications. The minimum thickness of chemical stripping agent applied shall be 0.125 (1/8) inches or the manufacturer's recommendations.

4. Stripping agents shall not be applied to, nor be allowed to inadvertently penetrate, wood and/or other porous substrates.

5. The required dwell time for stripping will depend upon the ambient temperature, humidity, and thickness of LBP. If LBP is not completely removed following the initial application of stripper, a second application and wet scraping may be required.

6. Removed LBP shall not be deposited on the polyethylene containment surfaces, but shall be transferred directly into 6-mil polyethylene bags from the scraper. LBP shall be removed by wet scraping to the maximum extent feasible.

7. Any residue not removable by wet scraping shall be washed down to the bare metal substrate with a high-phosphate solution. LBP-contaminated wastewater shall be kept to a minimum using wet scrub brushes or sponges. These residues and disposable cleaning media shall also be directly transferred to the 6-mil polyethylene bags containing other LBP wastes. Free standing water shall be eliminated by use of a drying agent.

8. Clearance will be performed as follows:

   a. Visual Clearance - Determine that all required work has been completed.
   Look for settled dust, paint chips or debris in work area. If located, cleanings will commence until visual inspection locates no evidence of dust.

   b. The Owner's Consultant shall perform Dust and/or Soil Sampling as outlined in the U.S. Department of Housing and Urban Development "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing".

C. Manual Demolition/Scraping/Cleaning: Assumed Exposure (50 ug/m^3 - 500 ug/m^3)

Manual demolition, scraping, manual sanding and power tool cleaning with dust collection systems shall be performed in conjunction with engineering and work practice controls meeting the requirements of 29 CFR 1926.62(e)(1).

Seal openings of HVAC ductwork and other penetrations (doors, windows, etc.) within the Control Area with two layers of 6-mil polyethylene sheeting. For work on vertical surfaces, place a layer of 6-mil polyethylene sheeting below the area prior to manual demolition/scraping/ cleaning. The sheeting shall extend 5 ft. on either side of the work area, to catch any paint chips that may become dislodged.

Wet methods shall be used during manual scraping, manual sanding and power tool cleaning with dust collection systems. Local HEPA ventilation shall be utilized in conjunction with manual scraping, manual sanding and power tool cleaning with dust collection systems. In the case that local HEPA ventilation is not sufficient to control dust hazards, the Contractor shall be required to install engineering controls to meet requirements of Specification Section 1.8(D) "Negative Air Pressure System".

Removed LBP shall not be allowed to accumulate on surfaces within the Control Area, but shall be HEPA vacuumed or placed directly into 6-mil polyethylene bags. The Contractor shall maintain all surfaces as free as practicable of accumulated lead dust to prevent the dispersal of lead into the work place. LBP shall be removed by manual methods to the maximum extent feasible.

Debris shall be bagged in 6-mil polyethylene bags and secured in leak proof drums until TCLP testing is completed. Follow proper disposal requirements. The area around the surfaces subject to work shall be wet wiped and HEPA vacuumed, including the polyethylene sheeting. Upon clearance by the Owner's Consultant, the polyethylene sheeting shall be carefully folded in on itself and placed in a 6mil disposal bag. Containment debris shall be properly disposed of as lead-based waste.

Clearance will be performed as follows and as needed:

a. Visual Clearance – determine that all required work has been completed. Look for settled dust, paint chips or debris in work area. If located, cleanings will commence until visual inspection locates no evidence of dust.
b. The Owner's Consultant shall perform Dust and/or Soil Sampling as outlined in the U.S. Department of Housing and Urban Development "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing".

D. Alternative Lead Work Procedures

1. Any Work Procedure other than the outline procedures above, shall be submitted to the Owner's Consultant for approval prior to the start of the project. As there are many different components in differing areas of the building(s), it is impractical to address every potential lead work procedure. The intent of alternative lead work procedures shall be to maintain compliance with 29 CFR 1926.62 and maintain airborne concentrations of lead dust below the Action Level of 30 ug/dL of air.

3.3 MONITORING & CLEARANCE SAMPLING

During the entire LBP removal and disposal operations, the Owner's Consultant shall be on-site directing the monitoring/sampling and inspecting the work to ensure that the health and safety requirements of this contract are satisfied.

A. Personnel Air Monitoring (Provided by the Contractor, as necessary)

1. Personnel air monitoring samples for airborne concentrations of lead shall be collected and analyzed in accordance with 29 CFR Part 1926.62. Results shall be reported in micrograms per cubic meter of air. The Competent Person shall use personal air monitoring results to determine the effectiveness of engineering controls, the adequacy of PPE and to determine if proper work practices are being employed. The Owner's Consultant shall be notified if any personal air monitoring result equals or exceeds 30 micrograms per cubic meter of air. The Contractor shall take steps to reduce the concentration of lead in the air.

B. Area Air Monitoring (Provided by the Owner's Consultant, as requested)
Airborne concentrations of lead shall be collected and analyzed in the laboratory. Results shall be reported in micrograms per cubic meter of air.

1. Pre-LBP work
Pre- LBP work samples shall be collected in the following locations: I) inside the lead control area, one upwind of the LBP work and two downwind of the LBP work procedure activities; and 2) outside the physical boundary (roped off) area, one upwind of the LBP work and two downwind of the LBP work activities. A total of six (6) samples. If work is performed inside the building, similar numbers of samples are to be positioned inside and outside the LBP containment area.

2. LBP Work
The Competent Person shall collect area air samples on a daily basis during the duration of the LBP work. The samples shall be collected in the same location as the pre-work samples.

3. The area air samples shall be collected at 4 to 6 feet above grade, and using high volume air samplers.

4. The air samples shall be analyzed by NIOSH Method 7082 or method approved by Engineer.

5. Results
The Contractor shall have the results of the area air monitoring within 24 hours after completion of the sampling. Results shall be reported in micrograms per cubic meter of air.

6. Excessive Levels
Outdoor LBP work shall cease and the Owner's Consultant notified if measured airborne lead concentrations, collected during LBP activities, exceed the pre-work airborne concentration levels. The Contractor may be required to clean and re-sample the affected area, at no additional cost to the Owner, if directed by the Owner's Consultant. The Contractor shall correct the work practices and/or engineering controls and shall resume LBP work procedures at the direction of the Owner's Consultant.

C. Waste Sampling and Testing (Provided by the Contractor)

Sampling and testing of all waste, shall be in accordance with 40 CFR Part 261, 6 NYCRR Part 371 and SW-846, Chapter 9, Sampling Plan. See Paragraph 3.5.C of this specification section for waste sampling and analyses requirements.

D. Soil Sampling (Provided by the Owner, as requested)

1. If the Owner's Consultant or Owner's representative observes paint chips or LBP debris on the surface of the soil surrounding the work area during the LBP work procedures or at completion or if the Owner's Consultant or IH/ Owner's Representative suspects potential contamination to the soil based on observed procedures and conditions during the work, the contractor shall pay for composite soil samples of the surface soil where designated by the Owner's Consultant and at a frequency specified by the Owner's Consultant. Two Background surface soil samples will be collected where directed by the Owner's Consultant. The samples shall be analyzed by an independent laboratory for lead on a total basis (by EPA Method 6010) and TCLP basis (Extraction Method 1311, analysis by EPA Method 6010).

2. Standard Soils Clearance samples shall be collected by the Owner's Consultant and paid for by the Owner. The samples shall be analyzed by an independent laboratory for lead on a total basis (by EPA Method 6010) and TCLP basis (Extraction Method 1311, analysis by EPA Method 6010).

3. If the analyses exceed the TCLP limit, the soil shall be treated as LBP contaminated waste, excavated and disposed of as a hazardous waste by the Contractor.

Clearance Level:

Soil: 400 microgram per gram

E. Dust/Wipe Sampling (Provided by the Owner, as necessary)

1. Dust/wipe samples shall be taken no sooner than 24 hours after abatement activities, including clean-up activities, have been completed.

2. Sampling for clearance criteria shall be performed as detailed in the HUD Guidance document. Appendices 13 and l4.

3. Failure to clear the work area and recleaning shall be the responsibility of the Contractor. The work area shall remain in place until satisfactory clearance has been achieved.

4. Analysis of Dust/Wipe samples for areas, which failed previous Dust/Wipe sampling, shall be reimbursed by the Contractor.

Clearance Levels:

Floors:	10 micrograms per square foot
Window Sills:	100 micrograms per square foot
Window Wells:	400 micrograms per square foot

3.4 ADJACENT AREAS

Damage to adjacent areas shall be repaired to the approval of the Owner.

3.5 CLEAN-UP & DISPOSAL

A. Cleanup

1. Daily
Surfaces in the LBP control area shall be maintained free of accumulations of paint chips, LBP debris, blasting debris and dust. Spread of dust and debris shall be restricted; waste shall not be distributed over the work area. Dry sweep or compressed air shall not be used for cleanup. At the end of each shift, the area shall be cleaned of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet wiping the area. LBP work procedures work shall cease during the cleanup.

2. At Completion of LBP work Procedure and a satisfactory visual inspection by the Engineer, a clean-up shall be performed by the Contractor. This clean-up includes removal of any contaminated material, equipment or debris including polyethylene sheeting from the work area. The polyethylene sheeting shall be sprayed or misted with water for dust control, construction debris removed and then the sheeting removed by folding it in upon itself.

   a. Lead-contaminated debris shall be containerized in accordance with paragraph 3.5.C.1, LBP Wastes and Lead-Contaminated Wastes. Waste bags shall not be overloaded, shall be securely sealed and stored in the designated area until disposal.

   b. Removal of surface polyethylene sheeting shall begin from top to bottom. Removal of floor polyethylene sheeting shall begin at the corners and folded in the middle to contain the dust. Polyethylene shall be disposed of as specified in Paragraph 3.5.C.l

   c. Cleaning Equipment. The Contractor shall decontaminate the lead abatement equipment and equipment used in the work area. The wastewater from cleaning shall be contained, sampled and disposed of as specified in Paragraph 3.5.C.2.

B. Certification

The Contractor shall certify in writing that the inside and outside the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, the respiratory protection for the employees was adequate, the work procedures were performed in accordance with 29 CFR Part 1926.62 and that there was no visible accumulations of lead-based paint and dust on the worksite. Do not remove warning signs at the lead control area or roped-off boundary signs prior to the Owner's Consultant's receipt of the Contractor's certification. Re-clean areas showing dust, residual paint chips. LBP debris and blasting debris.

Waste Storage, Sampling/Analysis and Disposal (Provided by the Contractor)

1. LBP Wastes and Lead-Contaminated Water

   LBP waste, and lead-contaminated waste and debris shall be stored sampled and analyzed and disposed of as follows.

   a. The LBP waste and debris, lead contaminated personal protective equipment (PPE), clothing and waste polyethylene and lead-contaminated waste and debris shall be containerized in DOT approved containers (i.e.. 55 gallon drums, roll-off, etc.). If the waste is placed in roll-off(s), the roll off shall be lined with a minimum of 2 layers of 6-il polyethylene prior to placing any waste in it and covered with a liquid tight cover. Each container shall be labeled to identify the type of waste as defined in 49 CFR Part 172, 6 NYCRR Part 371 and 6 NYCRR Part 360 and with the date lead contaminated wastes were first put into the container.

   b. A representative sample of the container(s) of LBP wastes and lead-contaminated wastes and debris generated by the LBP activities shall be taken in accordance with SW-. 846, Chapter 9, Sampling Plan and analyzed in the laboratory for TCLP lead by EPA Methods 1311 (extraction) and 6010 (analysis). If the wastes are placed in roll-off(s), four (4) composite samples per roll-off shall be taken for analysis. If the wastes are placed in *55* gallon drums, one composite sample for every ten (10) drums of wastes shall be taken for analysis. The laboratory analyses results shall dictate the proper method of disposal of the waste. A copy of the results shall be attached to the waste characterization (waste profile) form.

   c. A waste characterization (waste profile) form shall be completed for the LBP waste and lead-contaminated waste and debris, and lead contaminated personal protective equipment and clothing (if containerized separately) and the forms submitted to Owner's Consultant for approval The Owner shall sign the forms. The Contractor shall process the forms and forward to the disposal facility for approval. The approved waste profile forms from the disposal facility shall be submitted to the Owner and Engineer prior to shipment of the wastes off-site.

   d. The applicable waste transportation and disposal documents (i.e., hazardous waste manifest, bill of lading, non-hazardous waste manifest, land disposal restriction notification, etc.) shall be obtained and completed. An example of the completed waste transportation and disposal documents shall be submitted to Owner's Consultant for approval prior to shipment of the waste off-site.

e. Pick-up of hazardous wastes shall be made as needed to ensure that containers do not remain on the work site longer than 90 calendar days from the date affixed to each container. The Owner will assign an area for interim storage of waste-containing containers.

f. Lead contaminated personal protective equipment/ clothing, lead contaminated polyethylene, filters and debris, which cannot be sampled, shall be handled, stored, transported, and disposed of in the same manner as the LBP wastes and lead-contaminated wastes and debris, based on the sampling, laboratory analyses results and SW-846, Chapter 9, Sampling Plan calculations performed on the LBP wastes and lead-contaminated wastes and debris.

g. The LBP and lead contaminated wastes/ debris shall be handled, stored, transported and disposed of in accordance with 40 CFR Parts 260 to 265, 6 NYCRR Par 370 to 373, 6 NYCRR Part 364 and 6 NYCRR Part 360, as applicable. Additionally, the disposal shall be based on the sampling, laboratory analysis results and SW-846, Chapter 9, Sampling Plan calculations. Land disposal restriction notification shall be as required by 40 CFR Part 268 and 6 NYCRR Part 376.

2. Wastewater and Decontamination Water

a. Lead contaminated wastewater and decontamination water generated from the LBP work procedures shall be stored in DOT approved 55-gallon drums. Each drum shall be labeled to identify the type of waste as defined by 49 CFR Part 172, 6 NYCRR Part 371 and 6 NYCRR Part 360 and with the date lead contaminated liquid was first put into the drum.

b. A representative sample from the drum(s) of liquid wastes shall be taken in accordance with SW-846, Chapter 9, Sampling Plan and analyzed in the laboratory for total lead and total cadmium by EPA Method 200.7/6010. One composite sample for every ten (10) drums of liquid wastes shall be taken for analysis. The laboratory analyses results shall dictate the proper method of disposal of the waste. A copy of the results shall be attached to the waste characterization (waste profile) form.

c. A waste characterization (waste profile) form shall be completed for the liquid wastes and other wastes being generated and submitted to Owner's Consultant for approval. The Owner shall sign the form(s). The Contractor shall process the form(s) and forward the forms to the disposal facility for approval. The approved waste profile form(s) from the disposal facility shall be submitted to the Owner and Engineer prior to shipment of the wastes off-site.

d. The applicable waste transportation and disposal documents (i.e., hazardous waste manifest, bill of lading, non-hazardous waste manifest, land disposal restriction notification, etc.) shall be obtained and completed. An example of the completed waste transportation and disposal documents shall be submitted to Owner's Consultant for approval prior to shipment of the waste off-site.

e. The lead contaminated wastewater and decontamination water shall be handled, stored, transported and disposed of in accordance with 40 CFR Parts 260 to 265, 6 NYCRR Part 370 to 373, 6 NYCRR Part 364 and 6 NYCRR Part 360 as applicable.

3. Waste Pick-Up and Disposal

a. Waste pick-up cannot be performed until all required submittals have been reviewed and approved by the Owner's Consultant. The Owner must be present at waste pick-up to sign the waste transportation documents and approve pick-up. No waste shall leave the site without approval and authorization by Owner.

b. Coordinate scheduling of waste pick-up and transportation with Owner's Consultant. Notify Engineer at least 48 hours ahead of when the waste pick-up will take place.

c. All wastes shall be properly disposed of off-site at an approved disposal facility. The wastes shall be transported by a transporter permitted to transport wastes per 6 NYCRR Part 364. The wastes shall be disposed of at a facility permitted to accept the waste being disposed of.

d. Submit copy of completed and signed transportation and disposal documents to Owner and Engineer at time of shipment and submit copy of document signed by the disposal facility.

e. Return or cause to be returned all waste manifests and bills of lading signed by the disposal facility within fifteen *(15)* days of removal from the project site.

f. Submit certification of destruction for all incinerated wastes and certificates of final treatment and/or final disposal, as applicable, for all wastes disposed of off-site.

g. All waste transportation and disposal must be conducted in accordance with all applicable State, Local and Federal regulations, all generator State regulations, all the State regulations where the wastes are transported through, and the disposal State regulations.

C. Payment for Disposal of Wastes

Payment for disposal of wastes will not be made until the following are received by the Owner:

1. A signed copy of the manifests
2. Bills of lading
3. Weight tickets, etc.
4. Certificate of final disposal, from the final treatment or disposal facility certifying the amount of lead containing wastes and debris delivered.

PART 4 – INSPECTION

4.1 SUMMARY OF INSPECTION

Limited lead-based paint inspection was completed within specific Renovation Areas as detailed on Michael Shilale Architects, LLP architectural drawings to identify suspect lead-based paints and/or lead-containing hazards potentially affected by scheduled demolition/renovation activities included within the ***North Rockland High School Projects – Phase I***, as detailed within Section #1.2 of this specification.

Inspection was completed by Niton-certified XRF Technician & EPA Lead Inspector Mr. Nicholas Salerno of **QuES&T**, on October 18th of the year 2022.

Paint testing was completed on-site utilizing a Niton XLp-300A XRF Spectrum Analyzer Serial # 102273 in accordance with the EPA issued Performance Characteristics Sheet (PCS). A summary of results above the EPA action level of 1.0 mg/sq. cm., has been included to aid prospective bidders.

Survey was completed in accordance with EPA, OSHA and/or HUD Guidelines for inspection of lead-based paint(s) and/or lead-containing material(s). Per these protocols, all suspect coated surfaces impacted by demolition/renovation activities were located and categorized by homogeneous painting histories and component types.

4.2 SUMMARY OF RESULTS ABOVE THE EPA ACTION LEVEL OF 1.0 mg/cm^2

The following is a detailed listing of identified Lead-based Paint(s) and/or Lead-containing Materials, above the EPA action level of 1.0 mg/sq. cm. The following listing should be utilized as a guide to specific work-related tasks and is not necessarily an Abatement Scope. Specified lead-safe work practices shall be performed in accordance with the stipulations defined within this specification as required by specific work-related tasks and in advance of disturbance(s) of the following Lead-based Paint(s) and/or Lead-containing Material(s), above the EPA action level of 1.0 mg/sq. cm:

TABLE I: IDENTIFIED LEAD-BASED PAINT
NORTH ROCKLAND HIGH SCHOOL PROJECTS
PHASE 1

Location	LBP Component	Substrate	Color	LBP Condition
HIGH SCHOOL				
Weight Room Office, Wall, 4"	Cove Base Molding	Vinyl	Beige	Fair
Weight Room Office Bathroom, Wall	Wall Base	Ceramic	Beige	Fair
Weight Room Shower Storage, Wall	Wall Base	Ceramic	Beige	Fair
East Weight Room Storage, Exterior Door	Lintel	Metal	Brown	Fair
Weight Room Storage Area, Wall	Wall Base	Ceramic	Beige	Fair
Trainer's Room (Former Locker Room), Wall	Support Beam	Metal	White	Fair
It should be noted that several components tested did in fact contain minimal lead-levels below the EPA threshold level of 1.0 mg/sq. cm for classification as Lead-Based Paint (LBP) and are considered lead-containing coatings by the OSHA Regulation, "Lead Exposure in Construction" (29 CFR 1926.62). OSHA does not recognize a minimum limit for lead concentration in paint for the purpose of disturbance. Monitoring of workers performing demolition/cleaning/disturbance of painted surfaces shall be completed to document personnel occupational exposure. Items containing any amount of lead concentration are considered lead-containing coatings per 29 CFR 1926.62, OSHA Lead Exposure in Construction.				

END OF SECTION 028300

SECTION 031100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-In-Place Concrete: Section 033001.

1.02 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-16 of the American Concrete Institute.

1.03 DESIGN REQUIREMENTS

A. ACI 301, Section 2.1 – Formwork and formwork accessories, General:
   1. Add the following to 2.1.1 Description:

      The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 4 - Design of "Guide to Formwork for Concrete" (ACI 347-14).

B. Design Calculations and Drawings: Forms, including shores and reshores, shall be designed by a professional engineer licensed to practice in New York State. The engineer's calculations and drawings shall be signed and sealed by the engineer and kept on the job. Formwork shall be constructed in accordance with the engineer's signed and sealed drawings.

1.04 SUBMITTALS

A. Shop Drawings:

B. Product Data: Manufacturer's catalog sheets, specifications, and installation/application instructions for the following:
   1. Form systems and ties.
   2. Textured (architectural) form linings.

C. Samples:
   1. Textured (Architectural) Form Lining: 2 feet square section, each type.
   2. Rustication Strip: 1 foot long section, each profile.

1.05 QUALITY ASSURANCE

A. Field Examples: Provide formwork for mock-up of cast-in-place concrete. Construct forms using facing materials required to provide specified finishes and textures. Do not proceed with structure formwork until sample panels and forms have been approved by the Director in writing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Chamfer Strips: Wood, metal, PVC or rubber; 1 inch chamfer, unless otherwise indicated on the Drawings.

B. Rustication Strips: As required to provide rustication, patterns and profiles indicated on the Drawings.

C. Facing for Exposed Textured Finish Concrete Surfaces:

PART 3 EXECUTION

3.01 PREPARATION OF FORM SURFACES

A. Apply form-coating material in accordance with manufacturer's instructions.

3.02 INSTALLATION

A. Provide chamfer on all exposed external corners of concrete.

B. Provisions for Work of Related Contracts: Provide openings in concrete formwork to accommodate Work of related contracts. Obtain information for size and location of openings, recesses and chases from contractor requiring such items.

C. Shores and Supports:
1. Concrete members subject to additional loads during construction shall be shored in such a manner as will protect the member from damage by the loads.
2. Place shores supporting successive stories directly over those below or so design the shores to transmit the load directly to them.
3. Do not remove shores until the member supported has acquired sufficient strength to safely support its weight and any weight imposed thereon.

3.03 REMOVAL OF FORMS

A. ACI 301, Section 2.3.2 - Removal of Forms:

1. Change paragraph 2.3.2.5 to read as follows:
   2.3.2.5 Forms and shoring used to support the weight of concrete in beams, slabs and other structural members shall be removed in accordance with recommendations in paragraph 3.2.5 of "Recommended Practice for Concrete Formwork" (ACI 347-14).

2. Add the following paragraphs:
   2.3.2.8 All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.

3. Change paragraph 2.3.2.7 to read as follows:
   2.3.2.7 After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

3.04 RE-USE OF FORMS

A. Split, frayed, delaminated or otherwise damaged form facing material shall not be used.

END OF SECTION

SECTION 033001

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Vapor Retarder Under Slabs on Grade: Section 072600.

1.02 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-16 of the American Concrete Institute.

1.03 DEFINITIONS (Amendments to ACI 301, Section 1.2):

A. Exposed Construction: Exposed to view.

1.04 SUBMITTALS

A. Submittals Package: Submit product data for design mix(es) and materials for concrete specified below at the same time as a package.

B. Shop Drawings: Placing drawings for bar reinforcement.

C. Product Data:
1. Concrete design mix(es) with name and location of batching plant.
2. Portland Cement: Brand and manufacturer's name.
3. Fly Ash: Name and location of source, and DOT test numbers.
4. Air-entraining Admixture: Brand and manufacturer's name.
5. Water-reducing Admixture: Brand and manufacturer's name.
6. Aggregates: Name and location of source, and DOT test numbers.
7. Lightweight Coarse Aggregate: Brand and manufacturer's name
8. Chemical Hardener (Dustproofing): Brand and manufacturer's name, and application instructions.
9. Chemical Curing and Anti-Spalling Compound: Brand and manufacturer's name, and application instructions.
10. Bonding Agent (Adhesive): Brand and manufacturer's name, and preparation and application instructions.
11. Expansion Joint Filler: Brand and manufacturer's name.
12. Emery Aggregate: Brand and manufacturer's name, and application instructions.

D. Samples:
1. Fabric Reinforcement: 8 inches square.
2. Bar Supports: Full size.

E. Quality Control Submittals:
   1. Certificates: Affidavit required under Quality Assurance Article.

1.05 QUALITY ASSURANCE

A. Concrete batching plant shall be currently approved as a concrete supplier by the New York State Department of Transportation.

B. Fly ash supplier shall be currently approved as a fly ash supplier by the New York State Department of Transportation.

C. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
   1. Submit evidence consisting of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
      a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
   2. Fabricator's and Erector's Qualifications Data: Name and experience of fabricator and erector.

D. The Contractor agrees, that if the value of this contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

E. Source Quality Control: The Director reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:
   1. Batching and mixing facilities and equipment.
   2. Sources of materials.

1.06 STORAGE

A. Store materials so as to insure the preservation of their quality and fitness for the Work. Materials, even though accepted prior to storage, are subject to inspection and shall meet the requirements of the Contract before their use in the Work.

PART 2 PRODUCTS

2.01 MATERIALS (Amendments to ACI 301, Section 4, for Normal Weight Concrete and Section 7, for Lightweight Concrete):

A. Water-reducing Admixture: ASTM C 494, Type A, and on the New York State Department of Transportation’s current “Approved List”.

B. Fly Ash (Pozzolans): ASTM C 618, including Table 1A (except for footnote A), Class F except that loss on ignition shall not exceed 4.0 percent.

C. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with a minimum 18 percent total solids content. No thinning of material allowed.
   1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
   2. Cure & Seal 25 percent (J-22UV) by Dayton Superior Corp., 1125 Byers Rd., Miamisburg, OH 45342, (800) 745-3700.
   3. MasterKure CC 200 WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

D. Chemical Hardener (Dustproofing): Colorless aqueous solution of magnesium-zinc fluosilicate. Approved products include:
   1. MasterKure HD 300WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
   2. Surfhard by The Euclid Chemical Co., 19218 Redwood Rd., Cleveland, OH 44110, (216) 531-9222.
   3. Liqui-Hard by W.R. Meadows, Inc., PO Box 543, Elgin, IL 60121, (847) 683-4500.
   4. FluoHard by L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152, (402) 453-6600.
   5. Armortop by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.
   6. Diamond by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.

E. Type 1 Expansion Joint Filler: Preformed, resilient, non-extruding cork units; ASTM D 1752, Type II.

F. Type 2 Expansion Joint Filler: Preformed, resilient, non-extruding, self-expanding cork units; ASTM D 1752, Type III.

G. Type 3 Expansion Joint Filler: Preformed, resilient, non-extruding bituminous units; ASTM D 1751.

H. Chamfer Strips: Wood, metal, PVC or rubber; one inch chamfer.

I. Epoxy Bonding Agent (Adhesive): 100 percent solids epoxy-resin-base bonding compound, complying with ASTM C 881, Types I, II, IV and V, Grade 2 (horizontal areas) or Grade 3 (overhead/vertical areas), and Class B (40-60 degrees Fahrenheit) or Class C (60 degree Fahrenheit and above).
   1. SurePoxy HM Series by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
   2. Sikadur Hi-Mod 32 by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071, (800) 933-7452.
   3. MasterEmaco ADH 327 RS by by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

J. Emery Aggregate: Natural emery, crushed, polyhedral in shape, with not more than 10 percent flat or elongated pieces, properly screened, graded and packaged in the manufacturer's plant, and delivered to the site in sealed, labeled packages. Approved products include:

1. Emerundum by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.
2. Non-Slip Aggregate by Setcon Industries, Inc., 5 Mathews Ave., Riverdale, NJ 07457-1020, (201) 283-0500.
3. MasterTop 120SR by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

2.02 PROPORTIONING (Amendments to ACI 301, Sections 4 & 7):

A. Compressive Strength: As required by ACI 318-14 Table 19.3.2.1. "Requirements for concrete by exposure class".

B. Weight: Normal, except as indicated below:
1. Lightweight Concrete (for floor fills): Air-dry unit weight between 95 and 115 lb/cu ft.

C. Durability: Concrete shall be air-entrained. Design air content shall be according to ACI 318-14 Table 19.3.2.1 "Requirements for concrete by exposure class", and ACI 318-14 Table 19.3.3.1 "Total air content for concrete exposed to cycles of freezing and thawing", with an allowable tolerance of plus or minus 1.5 percent for total air content. Entrained air shall be provided by use of an approved air-entraining admixture. Air-entrained cement shall not be used.

D. Slump: Maximum 4 inches; minimum 1 inch before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

E. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Director.

F. Selection of Proportions: Concrete proportions shall be established on the basis of previous field experience or laboratory trial batches, unless otherwise approved in writing by the Director.
1. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight concrete up to a maximum of 15 percent by weight of the required minimum (Portland) cement. If fly ash is incorporated in a concrete design mix, make necessary adjustments to the design mix to compensate for the use of fly ash as a partial replacement for (Portland) cement.
   a. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.
   b. Lower early strength of the concrete shall be considered in deciding when to remove formwork.

2.03 REINFORCEMENT (Amendments to ACI 301, Section 3):

A. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

B. Fabric Reinforcement: ASTM A 185, welded wire fabric, fabricated into flat sheets unless otherwise indicated.

C. Bar Supports: Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.

D. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

2.04 JOINTS AND EMBEDDED ITEMS (Amendments to ACI 301, Section 5.3.2.6):

A. Obtain bond at construction joints by the use of bonding agent (adhesive) in accordance w/section 5.2.1.7 or the use of cement grout.

2.05 PRODUCTION (Amendments to ACI 301, Section 5):

A. Provide ready-mixed concrete, either central-mixed or truck-mixed.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Do not use items of aluminum for mixing, chuting, conveying, forming or finishing concrete, except magnesium alloy tools may be used for finishing.

B. Keep excavations free of water. Do not deposit concrete in water.

C. Hardened concrete, reinforcement, forms, and earth which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.

D. Prior to placement of concrete, remove all hardened concrete spillage and foreign materials from the space to be occupied by the concrete.

3.02 FORMWORK (Amendments to ACI 301, Section 2):

A. The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 4 - Design of "Guide to Formwork for Concrete" (ACI 347-14).

B. All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.

C. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

3.03 PLACING REINFORCEMENT (Amendments to ACI 301, Section 3):

A. At the time concrete is placed, reinforcement shall be free of mud, oil, loose rust, loose mill scale, and other materials or coatings that may adversely affect or reduce the bond.

3.04 PLACING CONCRETE (Amendments to ACI 301, Section 5):

A. Operation of truck mixers and agitators and discharge limitations shall conform to the requirements of ASTM C 94.

B. Do not allow concrete to free fall more than 4 feet.

3.05 FINISHING FORMED SURFACES (Amendments to ACI 301, Section 5.3.3):

A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
1. Rough Form Finish for concrete surfaces not exposed to view.
2. Smooth Form Finish for concrete surfaces exposed to view.
3. Smooth Rubbed Finish for exterior concrete surfaces exposed to view.
4. Grout Cleaned Finish for interior concrete surfaces exposed to view.

3.06 FINISHING SLABS (Amendments to ACI 301, Section 5.3.4):

A. Slabs On Grade: Provide key type joints unless otherwise shown. Tool exposed joints.

B. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
1. Floated Finish for:
   a. Treads and platforms of exterior steps and stairs.
   b. Slabs and fill over which waterproofing, roofing, vapor barrier, insulation, terrazzo, or resin bound flooring is required.
2. Troweled Finish for:
   a. Interior slabs that are to be exposed to view.
   b. Slabs and fill over which resilient wood flooring, resilient tile or sheet flooring, carpet, or thin-film coating system is required.
   c. Slabs and fill over which thin-set ceramic tile is required, except fine-broom finished surface.
   d. Treads and platforms of interior steps and stairs.
3. Broom or Belt Finish for:
   a. Exterior slabs. Texture, as approved by the Director's Representative.
4. Scratched Finish for:
   a. Surfaces to be covered with ceramic tile set in a bonded thick mortar bed, except screed to a Class B tolerance.
   b. Surfaces to be covered with floor topping.
5. Integral Emery Aggregate Surfacing with Floated Finish for:
   a. Interior pedestrian ramps.

C. Finishing, General: Provide monolithic finishes on concrete floors and slabs without the addition of mortar or other filler material. Finish surfaces in true planes, true to line, with particular care taken during screeding to maintain an excess of concrete in front of the screed so as to prevent low spots. Screed and darby concrete to true planes while plastic and before free water rises to the surface. Do not perform finishing operations during the time free water (bleeding) is on the surface.

D. Integral Emery Aggregate Surfacing: Provide a nonslip "dry shake" finish with emery aggregate. Apply emery aggregate in accordance with the manufacturer's printed application instructions for a moderate duty nonslip surface, unless otherwise indicated.

3.07 CURING AND PROTECTION (Amendments to ACI 301, Section 5.3.6):

A. Maintain concrete surfaces in a moist condition for at least 7 days after placing, except where otherwise indicated. Do not use curing compound.
   1. For surfaces of exterior slabs (on grade), apply chemical curing and anti-spalling compound in accordance with the recommendations of the manufacturer.

3.08 CHEMICAL HARDENER (DUSTPROOFING)

A. Apply chemical hardener to all troweled finished interior floors which are to be left exposed.

B. Do not apply chemical hardener until concrete has cured the number of days recommended in manufacturer's instructions.

C. Prepare surfaces and apply chemical hardener in accordance with manufacturer's printed instructions and recommendations.

3.09 FIELD QUALITY CONTROL (Amendments to ACI 301, Section 1):

A. Make available to the Director's Representatives whatever test samples are required to make tests. Furnish shipping boxes for compression test cylinders.

END OF SECTION

SECTION 034133

PRECAST PRESTRESSED CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The provisions of this Section apply to precast pretensioned concrete sections, indicated on the Drawings as Precast Concrete Hollow-Core Planks, and referred to in this Section as prestressed units.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-In-Place Concrete: Section 033001.

1.03 REFERENCES

A. Welding: Structural Welding Code - Steel AWS D1.1 by the American Welding Society (AWS Code).

1.04 DESIGN REQUIREMENTS

A. Design of Prestressed Units: By manufacturer.

B. Design Loads: Indicated on the Drawings.

C. Design procedure and allowable stresses shall conform to American Concrete Institute's standard "Building Code Requirements for Reinforced Concrete (ACI 318)", unless otherwise indicated.

D. Deviations from details shown on the Drawings or from the specifications, when such deviations are of a minor nature, may be accepted by the Client’s Representative in order to accept the approved manufacturer's standard product. Any additional cost due to such deviations accepted by the Client’s Representative shall be borne solely by the Contractor.

1.05 SUBMITTALS

A. Submittals Package: Submit the shop drawings and design data specified below at the same time as a package.

B. Shop Drawings: Submit fully dimensioned fabrication and erection drawings. Include details of clearances, arrangements, piece markings, reinforcing, weld plates and welding, inserts, anchors, connections, accessories, joints, openings, and other requirements. When shop drawings are "Approved as Noted", promptly resubmit copies of corrected drawings for final approval and record.

C. Quality Control Submittals:

1. Design Data: Submit prestress design calculations. Calculations shall include the complete design, including the stresses in steel and concrete, based on moment and shears obtained from loads shown on the Drawings and from construction and erection procedures. Indicate deflections and cambers of prestressed units. Design calculations shall be prepared under the direction of, and sealed by, a New York State licensed Professional Engineer.
   a. Submit proposed design mixes for prestressed concrete a minimum of six weeks prior to start of fabrication. Concrete mixes shall be established as specified in Section 3.9 of ACI 301-84 of the American Concrete Institute.
   b. Submit load-strain curves of the prestressing steel delivered, or other data from which the elongations appropriate to the required prestressing force can be determined. The calculated elongations of each prestressing strand in each prestressed unit shall be submitted 3 weeks prior to stressing of the strands.
2. Certificates: Affidavit required under Quality Assurance Article.
3. Manufacturer's Qualifications Data:
   a. Firm name, address, and telephone number.
   b. Period of time firm has manufactured precast prestressed concrete.
   c. Copy of Precast/Prestressed Concrete Institute Plant Certification Program certificates.
   d. The names and addresses of 5 similar projects completed by the firm. Include name and phone number of contact person.
4. Installer's Qualifications Data:
   a. Name of each person who will be performing the Work and their employer's name, business address and telephone number.
   b. Period of time installer has installed precast prestressed concrete.
5. Welder's Qualifications Data: Copy of AWS certification for type of welding required.

1.06 QUALITY ASSURANCE

A. Manufacture: Prestressed units shall be plant fabricated.

B. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
   1. Submit evidence consisting of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
      a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.

C. Qualifications:
   1. Manufacturer: The firm manufacturing the Work of this Section shall have been regularly engaged in the manufacturer of precast prestressed concrete for a minimum of 5 years, and shall have manufactured precast prestressed concrete on 5 similar projects in the last 5 years.
      a. At the time of bidding the precast concrete manufacturing plant shall be certified by the Precast/Prestressed Concrete Institute

Plant Certification Program, with certification in Product Group Category C2 - Prestressed Hollow-core and Repetitive Products.

b. Work on the precast prestressed concrete shall not proceed until approval of the proposed manufacturer has been given by the Client's Representative.

c. If requested, the manufacturer shall permit representatives of the Client's Representative and/or designated inspection laboratory to inspect his plant facilities before shop drawings are submitted. The proposed manufacturer will not be approved if, in the opinion of the Client's Representative, his plant facilities are inadequate.

2. Installer: The person(s) performing the Work of this Section and their Supervisor shall be personally experienced in the installation of precast prestressed concrete and shall have been regularly employed by a Company installing structural precast concrete for a minimum of 2 years.

3. Welder: Welding shall be performed only by welders who have been qualified by tests as prescribed in the AWS Code to perform the type of welding required.

D. Source Quality Control:

1. The manufacturer's plant, equipment, personnel, design, fabrication techniques, testing, inspection and records shall comply with Pre-stressed Concrete Institute's "Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products (MNL-116)", unless otherwise indicated.

a. Concrete Test Cylinders: Failure of test cylinders to develop required minimum compressive strength shall be cause for rejection of the prestressed units made from the concrete represented by the cylinders.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Load, transport, and unload prestressed units by methods that will prevent damage.

B. Storage: Store prestressed units on firm surfaces off the ground. Support prestressed units at points comparable to design support conditions.

C. Handling: Lift and support prestressed units at the points shown on the approved shop drawings or at the supporting points on which the units will set when in service.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C 150, Type II or Type III Portland cement.

B. Aggregates: ASTM C 33.

C. Water: Fresh, clean, and free from injurious amounts of oils, acids, alkalis, salts, organic material, or other deleterious substances.
   1. Mixing water, including that contributed by the aggregates, shall not contain a deleterious amount of chloride ion.

D. Air-entraining Admixture: ASTM C 260.

E. Prestressing Tendons: Uncoated, seven-wire, stress-relieved steel strand conforming to ASTM A 416.

F. Reinforcing Steel:
   1. Bars: ASTM A 615, deformed.
   2. Wire Fabric: ASTM A 185, welded.
   3. Fabricated Bar or Rod Mats: ASTM A 184.

G. Steel Shapes, Plates, and Anchor Bolts: ASTM A 36, except as otherwise indicated on the Drawings.

H. Bearing Pads/Strips: Manufacturer's standard neoprene or tempered press wood pads or strips, except as otherwise indicated on the Drawings.

2.02 CONCRETE MIXES

A. Strength: The minimum compressive strength of concrete shall be 5000 psi at 28 days, except as otherwise indicated on the Drawings.

2.03 GROUT MIXES

A. Portland cement and sand grout mixes complying with ASTM C 476 and selected for the type of prestressed units and construction indicated on the Drawings.

2.04 FABRICATION

A. Forms shall be designed and constructed to insure close control of dimensions and details shown on the Drawings, and in a manner that will not restrict movement of the casting when pretensioning forces are released. Forms shall be constructed with tight joints and in a manner that will permit removal without defacing the cast concrete. Forms shall leave smooth cast surfaces, unless otherwise indicated. Thoroughly clean forms and apply approved form release coating before each casting.
   1. Form openings shown on the Drawings and openings 10 inches and larger (in diameter or on a side) requested by the Client’s Representative's Representative at least 48 hours before fabrication, including openings for items in separate related contracts (if any).

B. String tendons by a method which will avoid rotations in the tendon. Take care to keep tendons clean and dry.

C. Accurately locate and securely anchor reinforcing steel, weld plates, inserts, and other required embedded items with devices that will not be exposed on or mar

exposed surfaces of prestressed units. Embedded items shall be free of loose and flaky rust, and free of oil, paint and other coatings.

D. Prestressing shall be done in accordance with American Concrete Institute's standard "Building Code Requirements for Reinforced Concrete (ACI 318)", unless otherwise indicated.
   1. The tensioning process shall be so conducted that the tension being applied and elongation of the tendons may be measured at all times.
   2. The transfer of the prestressing force to the concrete unit shall not be done before the concrete has attained the minimum strength of 3000 psi or the strength required by the calculations whichever is greater; the concrete strength shall be confirmed by the testing of cylinders made from the same concrete as the unit to which the prestress force is to be applied. The application of the prestress force to the concrete shall be done smoothly and gradually.

E. Place and consolidate concrete. Concrete shall be compacted and vibrated as required to insure full contact with embedded items and to completely fill corners and angles of the forms.

F. Finish unformed concrete surfaces smooth, unless otherwise indicated.

G. After casting or completion of surface finishing, prestressed units shall be steam cured or cured with radiant heat and moisture unless otherwise approved.
   1. Apply steam or radiant heat and moisture after concrete has attained its initial set. Use an effective curing method to prevent surface drying during the period between placement of concrete and application of steam or radiant heat and moisture.
   2. Rate of increasing concrete temperature shall not exceed 45 degrees F. per hour. The maximum curing temperature shall be 160 degrees F. Take precautions so jets of steam or heating elements do not hit or touch the prestressed units, forms, or the test cylinders curing with the member.
   3. Duration of curing shall be dictated by cylinder strengths required for detensioning.

H. Apply one coat of shop paint to all surfaces of ferrous metal which will not be embedded in concrete or masonry.

I. Fabrication Tolerances: Conform to the recommended dimensional tolerances in Prestressed Concrete Institute's "Manual For Quality Control For Plants and Production of Precast Prestressed Concrete Products (MNL-116)".

2.05 SOURCE QUALITY CONTROL

A. Plant Inspection: Inspection by the State of all phases of fabrication may be made at the discretion of the Client’s Representative. Representatives of the Client’s Representative and/or inspection laboratory designated by the Client’s Representative shall be given access to the plant at all times that Contract Work is in progress. Inspections will be made without cost to the Contractor.
   1. Plant inspection by the State shall not relieve the manufacturer of responsibility for his own inspection program.

2. Schedule, coordinate and perform the plant fabrication in a manner to minimize the cost to the State for inspection. When failure to perform the Work on schedule or to coordinate the schedule in advance with the inspectors results in excessive inspection costs, the State will backcharge such excess cost to the Contractor.

B. Verification of Performance: Do not ship prestressed units to the site until the units have attained sufficient strength to support erection and anticipated construction loads.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine surfaces to receive prestressed units for defects that will adversely affect the execution and quality of the Work. Check location and condition of bearing surfaces. Verify that required inserts and anchors for connection to prestressed units have been installed. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Surface Preparation: Thoroughly clean surfaces of adjoining construction of loose and foreign matter.

3.03 INSTALLATION

A. Install prestressed units in their designed positions and in accordance with the manufacturer's approved shop drawings and instructions.
1. Adjust units to be exposed in the finished work as required to comply with allowable tolerance.

B. Securely fasten prestressed units in place.
1. Field Welding: Unless otherwise indicated, comply with AWS Code for the procedures for shielded metal-arc welding.
2. Grouting: Grout prestressed units with approved grout mix(es). Where roof differential camber between adjoining units exceeds 1/4 inch, also apply grout on the lower units at the joints on a 1 to 12 bevel.

C. Refinish damaged surfaces (if unit is not structurally damaged) to match adjacent areas.

D. Installation Tolerances: When prestressed units are to be exposed in the finished Work, the maximum differential in elevation or alignment on the exposed surface between adjoining units in place shall be 1/4 inch.

3.04 CLEANING

A. After installation, clean soiled and dirty concrete surfaces of pre- stressed units which will be exposed in the finished Work with detergent and water, using fiber brush and sponge. Immediately rinse thoroughly with clean water.

END OF SECTION

SECTION 040110 - MASONRY CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cleaning the following:

1. Unit masonry surfaces.

1.3 ALLOWANCES

A. Allowances for cleaning masonry are specified in Section 012100 "Allowances."

1.4 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to cleaning masonry including, but not limited to, the following:

a. Verify masonry-cleaning equipment and facilities needed to make progress and avoid delays.
b. Materials, material application, and sequencing.
c. Cleaning program.
d. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform masonry-cleaning work in the following sequence:

1. Remove plant growth.
2. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
3. Clean masonry surfaces.
4. Where water repellents are to be used on or near masonry, delay application of these chemicals until after cleaning.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to masonry repair Sections. Patch holes in mortar joints according to masonry repointing Sections.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include material descriptions and application instructions.
2. Include test data substantiating that products comply with requirements.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For paint-remover manufacturer and chemical-cleaner manufacturer.

B. Preconstruction Test Reports: For cleaning materials and methods.

C. Cleaning program.

1.9 QUALITY ASSURANCE

A. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage.

1. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness for this Project.

B. Mockups: Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Cleaning: Clean an area approximately 25 sq. ft. for each type of masonry and surface condition.

a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage one or more chemical-cleaner manufacturers to perform preconstruction testing on masonry surfaces.

1. Use test areas as indicated and representative of proposed materials and existing construction.
2. Propose changes to materials and methods to suit Project.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry-cleaning work to be performed according to product manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least seven days after completion of cleaning.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Water: Potable.

B. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

C. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.

2.2 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

PART 3 - EXECUTION

3.1 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
3. Neutralize alkaline and acid wastes before disposal.
4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

B. Remove light fixtures and associated hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 CLEANING MASONRY, GENERAL

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 50 feet away by Architect.

B. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use only those cleaning methods indicated for each masonry material and location.

1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.

2. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints.

    a. Equip units with pressure gages.
    b. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.
    c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
    d. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed according to the "Cleaning Appearance Standard" Paragraph, so that cleaned surfaces blend smoothly into surrounding areas.

F. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.3 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
2. Remove paint and calking with alkaline paint remover.

    a. Comply with requirements in "Paint Removal" Article.
    b. Repeat application up to two times if needed.

3. Remove asphalt and tar with solvent-type paste paint remover.

    a. Comply with requirements in "Paint Removal" Article.
    b. Apply paint remover only to asphalt and tar by brush without prewetting.
    c. Allow paint remover to remain on surface for 10 to 30 minutes.
    d. Repeat application if needed.

3.4 CLEANING MASONRY

A. Detergent Cleaning:

1. Wet surface with cold water applied by low-pressure spray.
2. Scrub surface with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
3. Rinse with cold water applied by low-pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

B. Mold, Mildew, and Algae Removal:

1. Wet surface with hot water applied by low-pressure spray.
2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
3. Scrub surface with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
4. Rinse with cold water applied by low-pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage chemical-cleaner manufacturer's factory-authorized service representatives for consultation and Project-site inspection, to perform preconstruction product testing, and provide on-site assistance when requested by Architect. Have chemical-cleaner manufacturer's factory-authorized service representatives visit Project site not less than twice to observing progress and quality of the work.

3.6 FINAL CLEANING

A. Clean adjacent non-masonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from site and roof. Rinse off roof and flush roof drains and downspouts.

C. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 040110

SECTION 040120.63 - BRICK MASONRY REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repairing brick masonry.
2. Removing abandoned anchors.
3. Painting steel uncovered during the work.

B. Related Requirements:

1. Section 013516 "Alteration Project Procedures" for general remodeling, renovation, repair, and maintenance requirements.

1.3 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to authorized work covered by estimated quantities.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi ; 4 to 6 gpm.

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to brick masonry repair including, but not limited to, the following:

a. Verify brick masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for colored mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Repair masonry, including replacing existing masonry with new masonry materials.
6. Point mortar and sealant joints.
7. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
8. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 040120.64 "Brick Masonry Repointing."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Samples for Initial Selection: For the following:

1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.

   a. Have each set contain a close color range of at least six Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
   b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Types Used for Mortar: Minimum 8 oz. of each in plastic screw-top jars.
3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.

   a. Have each set contain a close color range of at least six Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.

4. Include similar Samples of accessories involving color selection.

C. Samples for Verification: For the following:

1. Each type of brick unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.

2. Each type of patching compound in the form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
3. Accessories: Each type of accessory and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For including field supervisors and workers and testing service.

B. Quality-control program.

1.9 QUALITY ASSURANCE

A. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

B. Mockups: Prepare mockups of brick masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

    a. Replacement: Four brick units replaced.
    b. Patching: Three small holes at least 1 inch in diameter for each type of brick indicated to be patched.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on brick masonry as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Replacement Brick: Test each proposed type of replacement brick according to sampling and testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
3. Existing Brick: Test each type of existing brick indicated for replacement according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
4. Existing Mortar: Test according to ASTM C 1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.

B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

F. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.12 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit brick masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

1. When air temperature is below 40 deg F , heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F .
2. When mean daily air temperature is below 40 deg F , provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repairing brick masonry (brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

A. Face Brick: As required to complete brick masonry repair work.

1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties within 10 percent of those determined from preconstruction testing of selected existing units.

    a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2. Tolerances as Fabricated: According to tolerance requirements in ASTM C 216, Type FBX.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144.

1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

D. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

E. Water: Potable.

2.4 ACCESSORY MATERIALS

A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.

B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 (surface-tolerant, anticorrosive metal primer) or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

1. Surface Preparation: Use coating requiring no better than SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
2. VOC Limit: Use coating with a VOC content of 400 g/L or less.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

E. Wire Anchors brick ties are to be 9 gage minimum, and have a two-inch minimum bent end in the veneer. stainless steel, complying with ASTM A 366

2.5 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Rebuilding (Setting) Mortar by Property: ASTM C 270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.
2. Pigmented, Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove downspouts and associated hardware adjacent to masonry and store during masonry repair. Reinstall when repairs are complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 50 feet away by Architect.

3.3 ABANDONED ANCHOR REMOVAL

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.

1. Remove items carefully to avoid spalling or cracking masonry.
2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:

a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

3. Patch hole where each item was removed unless directed to remove and replace bricks.

3.4 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.

D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.

G. Replace removed damaged brick with other removed brick in good condition, where possible, or with new brick matching existing brick. Do not use broken units unless they can be cut to usable size.

H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
2. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.5 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning", as applicable to comply with paint manufacturer's recommended preparation.
2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.6 WIRE ANCHOR BIRCK TE INSTALLATION

A. Install ties as the brick is laid so that the ties are properly aligned with the mortar joints.

B. Install brick ties spaced 16” horizontally and 16” vertically.

C. Locate ties within 8" of door and window openings and within 12" of the top of veneer sections.

D. Bend the ties at a 90-degree angle at the nail head in order to minimize tie flexing when the ties are loaded in tension or compression.

E. Embed ties in joints so that mortar completely encapsulates the ties. Embed a minimum of 1.5" into the bed joint, with a minimum mortar cover of 5/8" to the outside face of the wall.

3.7 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.9 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.

B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION 040120.63

SECTION 040120.64 - BRICK MASONRY REPOINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repointing joints with mortar.

1.3 ALLOWANCES

A. Allowances for repointing brick masonry are specified in Section 012100 "Allowances."

B. Preconstruction testing is part of testing and inspecting allowance.

C. Repointing masonry is part of brick masonry repointing allowance.

1.4 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to authorized work covered by quantity allowances.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.5 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to repointing brick masonry including, but not limited to, the following:

a. Verify brick masonry repointing specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.7 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repointing work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to Section 040120.63 "Brick Masonry Repair." Patch holes in mortar joints according to "Repointing Masonry" Article.

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

B. Samples for Initial Selection: For the following:

1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least six Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Type Used for Pointing Mortar: Minimum 8 oz. of each in plastic screw-top jars.
3. Sealant materials.
4. Include similar Samples of accessories involving color selection.

C. Samples for Verification: For the following:

1. Sealant materials.
2. Accessories: Each type of accessory and miscellaneous support.

1.9 INFORMATIONAL SUBMITTALS

A. Qualification Data: For including field supervisors and workers and testing service.

B. Quality-control program.

1.10 QUALITY ASSURANCE

A. Brick Masonry Repointing Specialist Qualifications: Engage an experienced brick masonry repointing firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repointing work.

1. Field Supervision: Brick masonry repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that brick masonry repointing work is in progress.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas, each approximately 36 inches high by 48 inches wide for each type of repointing required, and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on masonry units as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Existing Brick: Test each type of existing brick indicated for repointing according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
3. Existing Mortar: Test according to ASTM C 295/C 295M, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
4. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.13 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits, General: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of material for repointing brick masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144.

1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

D. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

E. Water: Potable.

2.3 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 "Joint Sealants."

2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.

B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.4 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Pointing Mortar by Property: ASTM C 270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime. Add mortar pigments to produce mortar colors required.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below pointing work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove downspouts and associated hardware adjacent to masonry and store during masonry repointing. Reinstall when repointing is complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPOINTING, GENERAL

A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 50 feet away by Architect.

3.3 REPOINTING MASONRY

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints indicated as sealant-filled joints.
3. Joints at locations of the following defects:

    a. Holes and missing mortar.
    b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
    c. Cracks 1/16 inch or more in width and of any depth.
    d. Hollow-sounding joints when tapped by metal object.
    e. Eroded surfaces 1/4 inch or more deep.
    f. Deterioration to point that mortar can be easily removed by hand, without tools.
    g. Joints filled with substances other than mortar.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of 2 times joint width, but not less than 3/4 inch or not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.4 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040120.64

SECTION 04 22 23

ARCHITECTURAL CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architecturally styled concrete masonry units.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 07 60 00 - Flashing and Sheet Metal.

1.3 REFERENCES

A. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.

B. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

C. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units

D. ASTM C1262 - Standard Test Method for Evaluating the Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units and Related Concrete Units

E. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry.

1.4 DEFINITIONS

A. CMU: Concrete Masonry Unit.

B. Dimensions: All unit sizes are shown as Nominal Dimensions.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Scheduling: Provide to Owner or Owner’s representative a schedule and list of participants required to attend coordination and progress update meetings.
1. Owner representative(s) for Facilities Management.
2. General Contractor.
3. Project Manager.
4. Manufacturer’s Representative.
5. Project Architect.
6. Project Engineer.
7. Mason Contractor.

1.6 INFORMATIONAL SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Manufacturer's product information and data sheets for each product specified in this section, including:

1. Substrate preparation instructions and recommendations.
2. Installation means and methods.
3. Recommendations and requirements for proper storage and handling.

C. Warranty Information:
1. Submit confirmation and details of manufacturer's warranty, extended warranty, and replacement policies.

D. Submit product data for each type of product specified, including certification that each type complies with specified requirements.

E. Submit sample boards, cards or charts depicting available textures and colors for each CMU.

F. Mock-Up: Construct a mock-up using the selected stone and mortar materials to illustrate the appearance of the Work specified in this section.
1. The mock-up should be a nominal 36 inches x 36 inches (1m x 1m).
2. Construct the mock-up using the size, color blend, texture, joint size, and installation methods specified.
3. Architect and Owner's Representative must approve the mockup prior to commencement of Work.

1.7 CLOSEOUT SUBMITTALS

A. Spare Materials: Provide spare Concrete Masonry Units of each color and finish combination used on the project.
1. 12 spare units for each color and finish combination.
2. Provide spare materials as noted in the schedule related to work in this section.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver CMUs and other cementitious materials neatly stacked and packaged on pallets. Store pallets in single stacks on level ground and protect from weather.

B. Deliver mortar materials in original unbroken, undamaged packages with labels intact and visible.

C. Store materials covered and off the ground until used on the Work in this section.

1.9 WARRANTY

A. Provide the manufacturer's standard form in which the specified manufacturer agrees to replace products that fail to meet the ASTM Standards within the specified warranty period.
1. Warranty Duration: 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Echelon, An Oldcastle Company.
1. Address: 400 Perimeter Center Terrace, Atlanta, GA 30046.
2. Phone: (770) 804 3363. .
3. Website: www.echelonmasonry.com.

B. Provide products meeting the requirements specified in this section, from one of the following manufacturers:
1. <Manufacturer>.

C. Substitution Limitations:

1. Submit substitution requests in accordance with provisions of Section 01 60 00.
2. Single manufacturer will provide, from a single source, the following components:

2.2 PERFORMANCE REQUIREMENTS

A. Freeze-Thaw Resistance: Meet or exceed the requirements of ASTM C1262.

B. Abrasion Resistance: Meet or exceed the requirements of ASTM C744.

C. Adhesion: Meet or exceed the requirements of ASTM C744.

D. Color Change: Meet or exceed the requirements of ASTM C744.

E. Resistance to Crazing: Meet or exceed the requirements of ASTM C744.

F. Fire Resistance: Rated up to (4) four hours.

G. Integral Water Repellant: Concrete Masonry Units must include an integral water repellant (IWR) admixture at the time of production.

2.3 CONCRETE MASONRY UNITS

A. General / Appearance: Integrally colored pre-finished architectural concrete block meeting the requirements of ASTM C90, with a rough-hewn texture on one or more faces. Molded as two units attached face to face, the units are split after curing to expose a rough texture and reveals the aggregates used in the block.
1. Basis of Design Product: Split-Face masonry units, from Echelon.

B. General / Appearance: Integrally colored pre-finished architectural concrete block meeting the requirements of ASTM C90, manufactured using a combination of colored, tightly mixed aggregate to create a smooth ground face finish.
1. Basis of Design Product: Marble Face / Ground Face masonry units, from Echelon.

C. General / Appearance: Integrally colored pre-finished architectural concrete block meeting the requirements of ASTM C90. Shot Blasting produces a “weathered aggregate” surface.
1. Basis of Design Product: Shot Blasted / Weathered masonry units, from Echelon.

D. General / Appearance: Pre-faced architectural concrete block meeting the requirements of ASTM C90. Thermoset glazing compound is permanently molded on one or more faces, cured and heat-treated. Glazed facings are molded in individual molds, to ensure dimensional uniformity.
1. Basis of Design Product: Astra-Glaze-SW+® glazed concrete masonry units, from Echelon.

E. General / Appearance: Pre-finished, integrally colored concrete block meeting the requirements of ASTM C90. One or more faces are ground to expose the variegated colors of the natural aggregate. A factory-applied clear satin gloss acrylic enhances moisture resistance.
1. Basis of Design Product: Trendstone® concrete masonry units, from Echelon.

F. General / Appearance: Pre-finished, architectural concrete block meeting the requirements of ASTM C90. One or more faces are ground to emulate a smooth terrazzo finish. A factory-applied clear satin gloss acrylic enhances moisture resistance.
1. Basis of Design Product: Trendstone Plus® concrete masonry units, from Echelon.
2. .

2.4 FINISHES

A. Color:
   1. As selected from manufacturers standard color range.

B. Dimensions:
   1. <Type 1> CMU (WxHxD): __16___ inches x __8___ inches x _8____ inches. Locations and installation pattern as noted in the Contract Drawings.

2.5 MORTAR

A. Provide pre-blended mortar that meets or exceeds the requirements of ASTM C1714/C1714M Type S.

B. Mortar must include manufacturer approved compatible integral water repellent (IWR) additive added to each batch in the dosage rates for mortar type specified.

2.6 MIXES

A. Portland Cement: Conforming to ASTM C150 Type I, Type II or Type III as required to achieve optimal results based on ambient project conditions.

B. Hydrated Lime: Conforming to ASTM C207, Type S.

C. Aggregates: Conforming to ASTM C144 for mortar and ASTM C404 for grout.

D. Pigments: Conforming to ASTM C979. Comply with quantity limitations in referenced standards and from the pigment manufacturer.

E. Admixtures: Comply with quantity limitation specified ASTM C1384 "Standard Specification for Admixtures for Masonry Mortars" when adding to mortar.
   1. Cold Weather: Comply with ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
   2. Integral Water Repellant: Liquid polymeric, admixture that does not reduce flexural bond strength
      a. Basis of Design Product: RainBloc® Water Integral Repellent Masonry Unit admixture, manufactured by ACM Chemistries, Inc.

F. Water: Potable; Clean and drinkable.

2.7 ACCESSORIES

A. Provide coordinating accessory stones as necessary to achieve a complete installation as noted in the Contract Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are properly prepared to receive concrete masonry units.

B. Verify that bearing elements are within tolerances conforming to the requirements of ACI 117.

C. Verify that locations of penetrations, projections and built-in items are correct and properly prepared for work specified in this section.

D. Verify concrete brick masonry units are according to project specification and meet appropriate ASTM specification requirements. Commencement of installation constitutes acceptance of Concrete Face Brick, Concrete Masonry Units, Concrete Masonry Veneers, and Concrete Thin Veneers.

E. Preparation: Prepare surfaces and materials in accordance with MSJC Specifications for Masonry Structures. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

F. Provide adequate lighting for masonry work by placing all lighting at a reasonable distance from the wall for even illumination.

3.2 PREPARATION

A. Proceed with installation only after substrate(s) are been properly prepared and within tolerances recommended by the manufacturer.

B. Commencement of installation constitutes acceptance of site conditions.

C. Draw blocks from more than one pallet at a time during installation.

D. Refer to NCMA TEK Notes, for hot and cold weather construction practices.

3.3 INSTALLATION

A. Cutting: Make all unit cuts, including those for bonding, holes, boxes, etc., with motor-driven masonry saws, using either an abrasive or diamond blade. Cut neatly and locate for best appearance.

B. Concrete Masonry Units:
1. Install concrete masonry units in accordance with industry accepted masonry practices and manufacturer's instructions.
2. Bond Pattern: As indicated on Construction Drawings.
3. Do not use masonry units with broken corners and edges in excess of ASTM C90 and ASTM C1634.
4. Supporting and Forms: Construct forms as needed to adequately and safely support installed concrete masonry units until mortar has cured.

C. Mortar Bedding and Jointing:
1. Lay units with full mortar coverage on head and bed joints taking care not to block cores to be grouted or filled with masonry insulation.
2. Tool all joints into a concave configuration when mortar is thumbprint hard.
3. Remove mortar from the face of masonry units before it sets.
4. Tuckpoint joints of scored units for proper appearance and to prevent water penetration. Raked joints are not permitted and will be considered defective work.

D. Flashing: Install flashing at locations shown in the plans and in strict accordance with Construction Drawings, manufacturer’s instructions and accepted best practices for masonry flashing.

E. Weeps and Vents: Galvanized steel, plastic tubes, corrugated plastic cell vents or spun polymer drain mesh vents. Install weeps or vents at proper intervals at courses above grade and at any water stops over windows, doors and beams. Consult NCMA TEK notes for proper flashing and drawings.

3.4 FLASHING

A. All flashing and accessory detailing components must be corrosion resistant.

B. Verify that all flashing, including adjacent roof flashing, has been properly installed. Extend flashing material above horizontal terminations, roofing material, drainage planes or drainage products.

C. Integrate all flashing materials with moisture resistive barriers to prevent water penetration into structure. Lap water resistive barriers over weep screed flanges in a water shedding fashion.

D. Control Joints: Designer to determine if and where control joints are needed and identify locations. Consideration should be given to where differential movement is expected or where movement may be concentrated. Refer to NCMA TEK 10-02C for guidance on control joint locations.

3.5 INSPECTION AND CLEANING

A. Faces must conform to the requirements of ASTM C90 when viewed from twenty (20) feet at right angles to the wall with normal lighting.

B. Keep work surfaces clean during installation. Use brushes, rags and burlap to remove excess mortar lumps and smears prior to hardening on the finished surfaces.

C. Refer to Manufacturers recommendations for cleaning instructions for installed veneers.

END OF SECTION

SECTION 051200

STRUCTURAL STEEL

PART 1 GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Anchor Bolts: Installed under Section 033000 or 033001.

B. Loose Bearing Plates: Installed under Section 042000 or 042113 and 042200.

C. Loose Lintels: Installed under Section 042000 or 042113 and 042200.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Steel Joists: Section 052116 or 052119.

B. Steel Decks: Section 053100 or 053101.

C. Field Painting: Section 099101.

D. Concrete Fill for Columns: Section 033000 or 033001.

1.03 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:
   1. Design, Fabrication, and Erection: "Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design", June 1, 1989, by the American Institute of Steel Construction (AISC Specification).
   2. Standard Practice: Fabrication and erection practices shall comply with the "Code of Standard Practice for Steel Buildings and Bridges", June 10, 1992, by the American Institute of Steel Construction (AISC Code).
   3. Welding: "Structural Welding Code - Steel, AWS D1.1", by the American Welding Society (AWS Code).
   4. High-Strength Bolting: "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts", November 13, 1985, by the Engineering Foundation's Research Council on Structural Connections (Specification for Structural Joints).
   5. Cleaning Steel: Comply with the appropriate specifications (SSPC SP-X) by the Steel Structures Painting Council.

1.04 DEFINITIONS

A. AISC Manual: Where reference is made to the AISC Manual, it shall mean the Manual of Steel Construction, Ninth Edition, of the American Institute of Steel Construction.

1.05 REQUIREMENTS FOR CONNECTIONS

A. General:
   1. Size connections for the loads indicated on the Drawings. If the loads are not indicated, use a connection whose capacity is half the total uniform load capacity shown in the "Allowable uniform loads in kips for beams laterally supported" tables in the AISC Manual for the given shape, span, and steel specification of the beam in question, unless otherwise indicated.
   2. All bolted connections shall have a minimum of two bolts.

B. Shop Connections: Welded or high strength bolted, unless otherwise indicated. Field connections required to be welded or fully-tensioned high-strength bolted shall meet the same requirements when fabricated in the shop.

C. Field Connections:
   1. The following field connections shall be welded or fully-tensioned high strength bolted as indicated on the Drawings or, when not indicated, shall be either welded or fully-tensioned high strength bolted at the Contractor's option:
      a. Column bracing.
      b. Connections for support of machinery.

D. Standard Beam Connections:
   1. Unless otherwise shown on the Drawings or required in the Specifications, all beam connections shall be framed in accordance with Part 4 of the AISC Manual, with sizes and lengths of angles and welds and with fasteners spacings as shown therein.
   2. Standard beam connections shown on the Drawings shall be fabricated as detailed. Substitutions will not be approved.

E. High-Strength Bolted Connections: Amend the Specification for Structural Joints as follows:
   1. In Item 3(b) of the specification, change the second sentence to read "Burrs shall be removed."
   2. In Item 3(c) of the specification, delete the last two sentences, and add the following sentence: "Flame cut surfaces shall be ground smooth."
   3. In Item 7(b)(1) of the specification, add the following to the last sentence: ", except that oversize holes shall not be used in connections with galvanized faying surfaces."
   4. In Item 7(b)(2) of the specification, add the following to the last sentence: ", except that short slotted holes shall not be used in connections with galvanized faying surfaces when the force on the joint is in a direction other than normal to the axis of the slot."
   5. In Item 7(b)(3) of the specification, add the following to the last sentence: ", except that long slotted holes shall not be used in connections with galvanized faying surfaces when the force on the joint is in a direction other than normal to the axis of the slot."
   6. Change Item 7(c)(3) of the specification to read as follows: "All fully-tensioned high-strength bolts shall have a hardened washer under the element (nut or bolt head) turned in tightening, regardless of the method of tightening."

7. In Item 8(b) of the specification, change the first sentence to read: "A tension measuring device shall be required at all work sites where high-strength bolts are being installed."
8. In Item 8(c) of the specification, delete the second and third sentences and add the following sentence: " The snug-tight condition is defined as the tightness attained by either a few impacts of an impact wrench or the full effort of a worker with an ordinary spud wrench that brings the connected plies into firm contact."
9. Change the last sentence in Item 8(c) to read "Unless otherwise required in the Specifications, bolts required to be fully-tensioned shall be identified on the Drawings. All other bolts need only be tightened to the snug tight condition.".
10. In Item 9(b) of the specification, delete "Arbitration" from the heading. Also change the first paragraph to read: "When high-strength bolts have been installed by any of the tightening methods in Item 8(d), the following inspection procedure shall be used."
11. In Item 9(c) of the specification, delete "arbitration" from the last sentence.
12. In Item 9 of the specification, the inspection of bolt tightening shall be as specified under Item 9(b). Furnish the calibration device and the inspection torque wrench, and make them available, upon request, to representatives of the State or designated inspection laboratory during the entire period when steel is being fabricated and erected. The inspection torque wrench shall be capable of indicating that the job inspecting torque has been reached by a second method in addition to direct observation of the wrench dial. The inspection wrench calibration and the bolt tightening inspection shall be performed by the Contractor, and shall be witnessed by a representative of the Director or the designated inspection laboratory.

F. Design, Fabrication and Erection (Amendments to the AISC Specification):
1. In Item A6. of the specification, change "American Welding Society" to "American Welding Society (Latest Adoption Date)". Delete the date from all referenced AWS Codes.
2. In Item J1.8. of the specification, change the last sentence to read: "Weld access holes and beam copes in other shapes shall be ground smooth, but need not be inspected by dye penetrant or magnetic particle methods.".
3. In Item J1.8. of the specification, delete "or with A307 bolts" from the second paragraph.
4. In Item J2. of the specification, change the introductory sentence to read: "All provisions of the American Welding Society Structural Welding Code-Steel, AWS D1.1, except Sections 2.3.2.4, 2.5, 8.13.1 and 9, apply to work performed under this Specification.".
5. In Item J3.2.c of the specification, change the first sentence to two sentences as follows: "Oversized holes are permitted in any or all plys of slip-critical connections, except those with galvanized faying surfaces. Oversized holes shall not be used in slip-critical connections with galvanized faying surfaces, or in bearing-type connections.".
6. In Item J3.2.d. of the specification, change the second sentence to two sentences as follows: "Short-slotted holes are permitted without regard

to direction of loading in slip-critical connections, except those with galvanized faying surfaces. The length of the slot shall be normal to the direction of the load in slip-critical connections with galvanized faying surfaces and in bearing-type connections.".

7. In Item J3.2.e of the specification, change the second sentence to two sentences as follows: "Long-slotted holes are permitted without regard to direction of loading in slip-critical connections, except those with galvanized faying surfaces. The length of the slot shall be normal to the direction of the load in slip-critical connections with galvanized faying surfaces and in bearing-type connections.".
8. In Item M2.2. of the specification, delete the first two paragraphs.
9. In Item M2.5. of the specification, change the second sentence of the fifth paragraph to read: "Burrs shall be removed.".
10. Delete Item M4.5. of the specification in its entirety.
11. In Item M5.4. of the specification, delete "Slip-critical" from the heading and delete "slip-critical" from the first sentence.

G. Fabrication and Erection (Amendments to the AISC Code):
1. In Item 4.1. of the code, delete the last sentence of the first paragraph.
2. In Item 5.1. of the code, change the first paragraph to read: "Contract Drawings are not considered released for construction. Orders for materials may be placed only after approval of erection drawings or written approval of the Director.".

1.06 SUBMITTALS

A. Shop Drawings: Submit shop drawings for all structural steel. Machine duplicated copies of Contract Drawings will not be accepted as shop drawings. Shop drawings shall be standard 24 by 36 inch size sheets. The fabricator's name, address, and telephone number shall be indicated in the title block on each drawing.
1. Include anchor bolt and base plate plans, erection drawings, and detail drawings for all members.
2. Indicate shop and field welds by standard AWS welding symbols in accordance with AWS A2.4.
3. All shop drawings shall be checked by the detailer before submission. Failure to submit checked shop drawings will be cause for their disapproval without review.
4. Changes initiated by the detailer or fabricator to previously reviewed shop drawings shall be resubmitted.
5. When shop drawings are marked "Approved as Noted", promptly resubmit copies of corrected shop drawings for formal approval and record.
6. Contract Drawings are not considered released for construction. Orders for materials may be placed only after approval of erection drawings or written approval of the Director.

B. Product Data:
1. Shop Paint: Manufacturer's name and printed product literature, including storage and application instructions.

C. Quality Control Submittals:
   1. Certificates: Copy of certificates required under Quality Assurance Article.
   2. Fabricator's Qualifications Data:
      a. Firm's name, business address and telephone number.
      b. Summary of their quality control programs.
   3. Erector's Qualifications Data:
      a. Firm's name, business address and telephone number.
      b. Summary of their quality control programs.

D. LEED Design Submittals:
   1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
   2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

1.07 QUALITY ASSURANCE

A. Certification: Affidavit by the structural steel manufacturer certifying that steel material meets the contract requirements.
   1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
      a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.

B. The Contractor agrees, that if the value of this contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

C. Qualifications:
   1. Fabricator: The fabricator of the structural steel shall be regularly engaged in the fabrication of structural steel for a minimum of 5 years, and shall be subject to the approval of the Director.
      a. AISC Quality Certified Fabricators (latest list issued) are approved.
   2. Erector: The structural steel erector shall be regularly engaged in the erection of structural steel for a minimum of 5 years, and shall be subject to the approval of the Director.

D. Inspection: Shop and field quality assurance inspection may be made by the State. If quality assurance inspection is made by the State, it shall not relieve the fabricator and erector of responsibility for their own quality control programs.

E. Galvanizing: Stamp galvanized items with galvanizer's name, weight of coating, and applicable ASTM number.

1.08 WELDING PROCESS

A. Use only shielded metal arc, submerged-arc, gas metal arc, or flux cored arc welding.

1.09 WELDING PROCEDURE QUALIFICATION

A. Shielded metal arc, submerged arc, gas metal arc, or flux cored arc welding procedures which conform to the provisions of the AWS Code shall be considered to be prequalified.

B. The welding procedures requiring qualification shall conform to the requirements of AWS D1.1.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of anchor bolts and other anchorage devices to be built into other construction to avoid delay.

B. Upon delivery to the site, promptly cover and protect steel items (which are not required to receive shop paint) from rusting.

C. Store shop paint in accordance with paint manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wide Flange Structural Steel: ASTM A 992.

B. M and S-Shapes, Channels and Angles: ASTM A 36 or ASTM A 572, Grade 50.

C. HP-Shapes: ASTM A 572, Grade50.

D. Anchor Bolts, Miscellaneous Rods and Anchors, and Other Detail Material Not Proportioned for Calculated Stress: ASTM A 36; or ASTM A 675, Grade 70.

E. Exterior Lintels: ASTM A 36, galvanized.

F. High-Strength Bolts: ASTM A 325.

G. Steel Pipe: ASTM A 53, Type E or S, Grade B.

H. Steel Hollow Structural Sections (Round, Square, or Rectangular): ASTM A 500, Grade B; or ASTM A 501.

I. Weld Filler Metal:
   1. General: Weld filler metal shall be in accordance with Table 4.1.1 of the AWS Code, except as follows:

a. Only electrode and flux combinations complying with AWS Classifications F7AX-EXXX or F7AX-EXXX-a, (a = B2, Ni1, Ni2, Ni3 or W), shall be used for submerged arc welding.
b. Only electrode and shielding gas combinations complying with AWS Classifications E 7XT-1 or E 7XT-5 shall be used for flux cored arc welding.

2. Weld filler metal for shielded metal arc, submerged arc, gas metal arc, and flux cored arc welding which conforms to AWS Specifications A5.1 or A5.5 shall be considered to be prequalified.

H. Cold Galvanizing Compound: Single component compound giving 93 percent pure zinc in the dried film, and meeting the requirements of DOD-P-21035A (NAVY).

I. Shop Paint (General): Steel primer selected from the following:
1. TNEMEC 10-99 (Red), 10-99G (Green) or 10-1009 (Gray).
2. Rust-Oleum 769.
3. Valspar 13-R-53.
4. Sherwin-Williams "Kromik".

J. Shop Paint for Galvanized Steel: FS TT-P-641, Type II.

K. Shop Paint for Exterior ~~Equipment Supports~~ Structural Steel (High-Ratio Water Based Inorganic Zinc Silicate): Steel primer selected from the following:
1. Sherwin Williams ZincClad X1.
2. Carboline Carbozinc 18 WB.

L. Bedding Mortar:
1. Cement Grout: Portland cement complying with ASTM C 150, Type I or III, and clean uniformly graded natural sand complying with ASTM C 404, size No. 2; mixed at a ratio (by volume) of 1.0 part cement to 3.0 parts sand, with only the minimum amount of water required for placement and hydration.
2. Shrink-Resistant Grout (Ferrous): Factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:
a. Embeco 636 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122 (800) 227-3350.
b. Ferrolith G-NC by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.
c. Ferro-Grout by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NB 68152, (800) 362-3331.
d. Vibra-Foil by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.
3. Shrink-Resistant Grout (Non-Staining): Factory-packaged, non-ferrous mortar grouting compound selected from the following:
a. Masterflow 713 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122 (800) 227-3350.
b. Sonogrout by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.

c. Five Star Grout by Five Star Products, Inc., 425 Stillson Rd., Fairfield, CT 06430, (800) 243-2206.
d. Crystex by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NB 68152, (800) 362-3331.
e. Non-Corrosive, Non-Shrink Grout by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.

2.02 FABRICATION

A. Do not commence fabrication until the fabricator has been approved and the fabrication schedule has been coordinated with the designated Quality Assurance inspection agency (independent inspection laboratory or the State).
1. Give the Director's Representative one week advance notice of the commencement of fabrication.

B. Progress shop fabrication from "Approved" or "Approved as Noted" detail drawings only.
1. When detail drawings are "Approved as Noted", progress fabrication in strict accordance with notes thereon.
2. Fabrication progressed from "DISAPPROVED" or "RETURNED FOR CORRECTION" detail drawings will be rejected. The contractor shall have no claim against the State for any costs or delays due to rejection of items fabricated from "DISAPPROVED" or "RETURNED FOR CORRECTION" detail drawings.

C. Finish column ends at base plates and at load carrying cap plates to a true plane square to the column, with a maximum American National Standards Institute surface roughness value of 500 microinches.

D. Pipe and Tube Columns: Shop weld a closure plate to top of columns to form a watertight closure.

E. Loose Lintels: Furnish lintels of length to have 6 inches minimum bearing at each end.

F. Make provisions for connections of other Work, including all cutting and punching of structural members where required by the Drawings, or for which information is furnished prior to approval of the shop drawings.

G. Prepare material in accordance with Section 3 of the AWS Code. Do not use gas or air carbon-arc cutting to cut or enlarge bolt holes.

H. Galvanizing: Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:
1. ASTM A 123 for plain and fabricated material.
2. ASTM A 153 for iron and steel hardware.

I. Cleaning Steel: Thoroughly clean all structural steel. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".

Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 "Hand Tool Cleaning", SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".

2.04 SHOP PAINTING

A. Thoroughly clean all structural steel. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, SSPC SP-6“ Commercial Blast Clean” or SSPC SP-7 “Brush-Off Blast Cleaning, or SSPC SP-10 “Near-White Blast Cleaning”.
   1. Thoroughly clean structural steel receiving sprayed-on fireproofing in accordance with recommendations of the manufacturer of the fireproofing material approved for use on this Project.
   2. Provide SSPC SP-1 “Solvent Cleaning” to all Hollow Structural Section (HSS) surfaces to be painted.
   3. Provide SSPC SP-10 “Near-White Blast Cleaning” to all steel members to receive High-Ratio Water Based Inorganic Zinc Silicate Paint.

B. Coordinate shop paint to be applied on steel receiving sprayed-on fireproofing with the manufacturer of the fireproofing material approved for use on this Project.

C. Galvanized Items:
   1. Galvanized items which are to be finish painted under Section 099101 shall be rinsed in hot alkali or in an acid solution and then in clear water.
   2. Welded and abraded galvanized surfaces shall be wire brushed and repaired with a coating of cold galvanizing compound applied in accordance with compound manufacturer’s instructions.

D. Exterior Exposed Steel:
   1. Provide surface profile range of 1.5 -2.0 mils for structural steel to receive High-Ratio Water Based Inorganic Zinc Silicate.
   2. Apply a stripe coat of High-Ratio Water Based Inorganic Zinc Silicate paint on all horizontal and vertical edges of exterior steel members, 2.0 mil dry film thickness.

E. Apply one coat of shop paint to all steel surfaces except as follows:
   1. Do not paint steel members designated “NP” on the Drawings.
   2. Paint steel surfaces scheduled to be painted that are inaccessible after assembly, except surfaces in contact, with two coats of shop paint before assembly.
   3. Do not paint steel surfaces to be field welded, contact surfaces of high-strength bolted slip-critical connections, steel to be encased in cast-in-place concrete, steel receiving sprayed-on fireproofing , and the top flange of beams and girders in composite construction.
   4. Do not paint galvanized items which are not to be finish painted under Section 099101.
   5. Apply two shop coats of High-Ratio Water Based Inorganic Zinc Silicate to all exterior steel member surfaces.

F. Apply paint and compound to the following minimum thickness per coat:
   1. Shop Paint (General): 4.0 mils wet film.
   2. Shop Paint for Galvanized Steel: 3.0 mils wet film.
   3. Cold Galvanizing Compound: 2.0 mils dry film.
   4. Shop Paint for Steel to receive Sprayed-On Fireproofing: Follow manufacturer’s recommendations.
   5. Shop Paint (Water-Based Zinc Silicate): 3.0 mils dry film.

PART 3 EXECUTION

3.01 ERECTION

A. Erect steel in accordance with the AISC Specification, the AISC Code, the AWS Code and the Specification for Structural Joints, except as otherwise specified.

B. Prepare and place shrink-resistant grout in accordance with grout manufacturer's printed instructions.
   1. Comply with manufacturer's instructions for preparation of surfaces in contact with grout, and for curing and protection of grout.

C. Do not use gas or air carbon-arc cutting to cut or enlarge bolt holes.

D. Do not make corrections or alterations to fabricated steel without prior written approval by the Director's Representative.

3.02 SCHEDULE OF GALVANIZED STRUCTURAL STEEL

A. In addition to items indicated on the Drawings, hot-dip galvanize structural steel members as indicated below:
   1. All exterior exposed steel.
   2. All loose lintels in exterior walls.
   3. All framing supporting refrigerator/freezer equipment.
   4. Nuts, washers, and the top 12 inches of exterior anchor bolts.

B. Two shop coats of High-Ratio Water Based Inorganic Zinc Silicate paint may be substituted in lieu of hot-dip galvanizing.

END OF SECTION

SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Insulation in voids inaccessible after fabrication or erection: Insulation furnished under the Work of Section 072100.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Structural Steel: Section 051200.

1.03 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:
   1. General Standard: "Specification for the Design of Cold-Formed Steel Structural Members" by the American Iron and Steel Institute (AISI Specification).
   2. Welding: "Structural Welding Code - Sheet Steel, AWS D1.3" by the American Welding Society (AWS Code).

B. Organizations:
   1. AISI: American Iron and Steel Institute, 1140 Connecticut Ave., NW, Suite 705, Washington, D.C. 20036, (202) 452-7100, www.steel.org.
   2. AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, (800) 443-9353, www.aws.org.
   3. ASTM: ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, (610) 832-9500, www.astm.org.
   4. SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656, (877) 281-7772, www.sspc.org.

1.04 SYSTEM DESCRIPTION

A. Type of Metal Framing: Load carrying, formed steel framing.
   1. Framing with studs and accessories.
   2. Framing with joists and accessories.

1.05 SUBMITTALS

A. Shop Drawings: Erection and fabrication drawings for all load carrying metal framing and accessories. Show plans and elevations at not less than 1/4 inch to 1'-0" scale, and details at not less than 1-1/2 inch to 1'-0" scale.
   1. Include the following in an early submission:
      a. Erection drawings indicating sizes and locations of all metal framing members.

b. Anchor bolt plan showing anchor bolts, if any, to be placed in cast-in-place concrete Work.
c. Show plans and elevations at not less than 1/4 inch to 1'-0" scale, and details at not less than 1-1/2 inch to 1'-0" scale.

2. Do not submit fabrication drawings, other than for anchor bolts, until after approval of the erection drawings.
3. When shop drawings are marked "Approved as Noted", promptly resubmit copies of corrected shop drawings for formal approval and record.

B. Product Data: Manufacturer's printed specifications and installation instructions for each type of metal framing and accessory, including data required to show compliance with the Drawings and Specifications.

C. Quality Control Submittals:
1. Certificates: Affidavit required under Quality Assurance Article.

1.06 QUALITY ASSURANCE

A. Certification: Affidavit certifying that sheet steel complies with specified quality, grade, and zinc-coating.

B. Fire Rated Construction: Wherever a fire resistance classification is indicated for metal framing components, provide framing and accessories which have been tested and classified or listed for the construction and rating shown.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal framing to the Site in manufacturer's unopened containers or bundles, identified with brand, type, and gage.

B. Protect metal framing from damage and rusting. Store off the ground in dry, ventilated space.

C. Store and handle metal framing in a manner that will not cause distortion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Framing (including Studs, Tracks, Joists, Perimeter Channel, and Rafters):
1. Members of 12, 14, and 16 Gage Steel: Galvanized, structural quality sheet steel; ASTM A653, Grade D (minimum yield 50 ksi).

B. Accessories and Fasteners:
1. Bracing, Bridging, Strapping, Reinforcement, Stiffeners, Plates, Gussets, Clip Angles, and Hangers: Unless otherwise indicated, metal framing manufacturer's standard products formed from ASTM A653 galvanized, structural quality sheet steel. Thickness and grade shall be determined

by application requirements, with a minimum thickness of 20 gage and a minimum yield of 33 ksi.

2. Power-Actuated Fasteners: Low velocity, powder activated, threaded studs complying with ASTM E 1190 and zinc coated in accordance with ASTM B633, Type III, Classification 5.
   a. Minimum Stud Size: 1/4-20 thread, 0.145 inch dia shank, with 1/4-20 nut and 5/8 inch outside dia washer.
   b. Stud Material: ASTM A510 1060 or 1065 steel.
   c. Minimum Core Hardness: 51-56 Rockwell C.
   d. Minimum Tensile Strength: 285,000 psi.
   e. Minimum Shear Strength: 182,000 psi.
3. Self-Drilling Fasteners: Cadmium plated, No. 12-14 x 3/4 inch, hex washer head, self-drilling, self-tapping fastener with pilot point.

C. Galvanizing: Hot-dip process complying with ASTM A653, Coating Designation G 60.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.02 FABRICATION

A. Fabricate metal framing in accordance with “Approved” or “Approved as Noted” fabrication drawings only.
   1. When fabrication drawings are “Approved as Noted”, progress fabrication in strict accordance with the marks and notes thereon.

B. Repairing Galvanizing: Clean shop welded and abraded surfaces, and repair them with a 2 mil (dry) minimum thick coating of galvanizing repair paint. Comply with paint manufacturer’s application instructions.

C. For metal framing indicated to receive insulation, install full width insulation in voids which will be inaccessible after fabrication.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine surfaces to receive metal framing for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 SURFACE PREPARATION

A. Clean surfaces that support the Work of this Section.

3.03 INSTALLATION

A. Install metal framing and accessories in accordance with approved shop drawings, and with the metal framing manufacturer's printed installation instructions.

B. Provide temporary bracing to ensure stability of the structure during construction.

C. Repairing Galvanizing: Clean field welded and abraded surfaces, and repair them with a 2 mil (dry) minimum thick coating of galvanizing repair paint. Comply with paint manufacturer's application instructions.

D. Tolerances:
1. Vertical Alignment (Plumbness) of Studs: Within 1/960th (1/8 inch in 10 feet) of the height.
2. Horizontal Alignment (Levelness) of Walls: Within 1/960th (1/8 inch in 10 feet) of their respective lengths.
3. Spacing of Studs: Not more than + 1/8 inch from the designed spacing, providing that the cumulative error does not exceed the requirements of the finishing materials.

E. For metal framing indicated to receive insulation, install full width insulation in voids which will be inaccessible after erection.

F. Installation of Runner Tracks:
1. Install continuous bottom and top tracks of size and gage shown. Align track accurately and, unless otherwise shown, attach to supporting structure with power-driven fasteners at 16 inches oc. Install fasteners at corners and ends of tracks.
2. At track butt joints, securely attach abutting pieces of track to a common structural element, or splice them with a welded butt joint.

G. Installation of Studs:
1. Install studs of size and gage shown. Space studs 16 inches maximum oc, unless otherwise shown.
2. Install additional studs at wall corners and intersections, adjacent to wall openings, at wall ends, and at both sides of control joints (if any).
   a. For gypsum board applications, keep studs not less than 2 inches nor more than 6 inches from inside corners.
3. Install full length studs, without splices, between runner tracks.
4. Install axially loaded studs with full bearing against the webs of the bottom and top runner tracks.
5. Plumb and align studs and, unless otherwise shown, provide positive attachment to runner tracks using self-drilling fasteners or welds on both flanges of studs.
6. Install lintels at wall openings wider than the stud spacing as shown or scheduled, or if not shown or scheduled, as recommended by the metal framing manufacturer for the opening spans and loads involved.
7. Unless otherwise shown, install rough framing at openings using full length studs at the ends of lintels and jack studs from the bottom track to the underside of the lintels. Install horizontal header tracks and, where required, horizontal sill tracks. Cut horizontal tracks to length, with split flanges and bent webs for flange overlap and attachment to jack studs

with self-drilling fasteners. Install cut to length intermediate studs between jack studs at head and sill sections at the same spacing as full length studs.

8. At door openings, install rough framing as specified in 7. above. Coordinate jack studs with the types of door frames to be furnished.
   a. Where solid core wood doors, double doors, or doors weighing more than 50 pounds are shown or scheduled, install 2 full length studs at the ends of lintels instead of one.
9. Install horizontal bridging in equally spaced rows, not exceeding 3'-4" oc. For each row, install solid bridging between studs at corners, ends of walls, openings, and not exceeding 5'-4" oc, plus continuous 2 inch by 16 gage strapping on both sides of the wall. Attach solid bridging to each flange of the studs with one self-drilling fastener, or make an equivalent welded connection. Attach the continuous strapping to flanges of all solid bridging with four self-drilling fasteners and to flanges of all studs with one self-drilling fastener, or make equivalent welded connections.
10. Install diagonal bracing as shown.

H. Installation of Joists:
1. Install joists of size and gage shown. Space joists 24 inches maximum oc, unless otherwise shown.
   a. Install additional joists under parallel partitions where the partition length exceeds 1/2 of the joist span.
2. Locate joists directly over bearing studs, or provide a load distribution member at the top track.
3. Unless otherwise shown, install joists with a minimum bearing of 1-1/2 inches at end supports and 3-1/2 inches at intermediate supports.
4. Install the following as shown, or if not shown, provide the metal framing manufacturer's recommended details:
   a. Framing connectors.
   b. Web stiffeners at bearing and concentrated load points.
   c. Reinforcement at intermediate supports.
5. Install bridging at joist ends and at intermediate supports, unless joists are otherwise restrained from rotation.
6. Install additional framing around floor openings wider than the joist spacing.
7. Unless otherwise shown, install transverse bridging at midspan for joist spans up to 15 feet, and in equally spaced rows not exceeding 8 feet oc for joist spans exceeding 15 feet. For each row, install solid bridging in the first two and last two joist spaces, and at single intermediate spaces not exceeding 10 feet oc, plus continuous 2 inch by 16 gage strapping on the bottom of the joists. The solid bridging shall be of the same depth as the joists and 16 gage minimum thickness. Fasten the solid bridging sections to the joists with 16 gage clip angles with a length one inch less than the joist depth, and with one row of self-drilling fasteners spaced 3 inches on center in each clip angle leg. Fasten the continuous strapping to the solid bridging with 4 self-drilling fasteners, and to the joist bottom flanges with one self-drilling fastener. Do not fasten the strapping by welding.

8. Provide temporary lateral support for the joist top flanges between the solid bridging locations until the deck material has been installed.
9. Install diagonal bracing as shown.

I. Installation of Rafters:
1. Comply with the applicable requirements for installation of joists, unless otherwise shown.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Anchor Bolts: Installed under Section 033000 or 033001.

B. Loose Bearing Plates: Installed under Section 042000 or 042113 and 042200.

C. Loose Lintels: Installed under Section 042000 or 042113 and 042200.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Structural Steel: Section 051200.

B. Exterior Painting: Section 099113.

1.03 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:
   1. Design, Fabrication, and Erection: "Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design" adopted by the American Institute of Steel Construction, June 1, 1989 (AISC Specification).
      a. Design and Fabrication of Cold-Formed Shapes: "Specification for the Design of Cold-Formed Steel Structural Members", by the American Iron and Steel Institute (AISI Specification).
   2. Welding: "Structural Welding Code - Steel, AWS D1.1", or "Structural Welding Code - Sheet Steel, AWS D1.3", by the American Welding Society (AWS Codes).

B. Organizations:
   1. AISC: American Institute of Steel Construction, One East Wacker Dr., Suite 700, Chicago, IL 60601-1802, 866-275-2472, www.aisc.org.
   2. AISI: American Iron and Steel Institute, 1140 Connecticut Ave., NW, Suite 705, Washington, D.C. 20036, (202) 452-7100, www.steel.org.
   3. AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, (800) 443-9353, www.aws.org.
   4. ANSI: American National Standards Institute, 1819 L Street, NW, 6th Floor, Washington, DC 20036, (202) 293-8020, www.ansi.org.
   5. ASME: ASME International, 3 Park Ave., New York, NY 10016-5990, (800) 843-2763, www.asme.org.
   6. ASTM: ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, (610) 832-9500, www.astm.org.

7. MPI: The Master Painters Institute Inc., 2808 Ingleton Ave., Burnaby, BC, V5C 6G7, (888) 674-8937, www.specifypaint.com.
8. SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656, (877) 281-7772, www.sspc.org.

1.04 SUBMITTALS

A. Shop Drawings: Show application to project. Furnish setting drawings and templates for installation of bolts and anchors in other Work. Indicate shop and field welds by standard AWS welding symbols in accordance with AWS A2.4.

B. Product Data: Catalog sheets, specifications, and installation instructions for each fabricated item specified, except submit data for fasteners only when directed.

C. Quality Control Submittals:
1. Certificates: Copy of certificates required under Quality Assurance Article.

D. LEED Design Submittals:
1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

1.05 QUALITY ASSURANCE

A. Certificates:
1. Affidavit by the structural steel manufacturer certifying that structural steel items meet the contract requirements.
   a. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
      1) Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
2. The Contractor agrees, that if the value of this contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

B. Galvanizing: Stamp galvanized items with galvanizer's name, weight of coating, and applicable ASTM number.

1.06 DELIVERY AND STORAGE

A. Coordinate delivery of items to be built into other construction to avoid delay.

B. Promptly cover and protect steel items delivered to the Site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wide Flange Structural Steel: ASTM A ~~36~~992, except as specified or shown otherwise.

B. M and S-Shapes, Channels and Angles: ASTM A 36 or ASTM A 572, Grade 50.

C. Steel Plates to be Bent or Cold-Formed: ASTM A 283, Grade C.

D. Steel Bars and Bar-Size Shapes: ASTM A 675, Grade 70; or ASTM A 36.

E. Merchant Quality Steel Bars: ASTM A 575, grade as selected by fabricator.

F. Cold-Finished Steel Bars: ASTM A 108, grade as selected by fabricator.

G. Hot-Rolled Carbon Steel Sheet and Strip: ASTM A 569, pickled and oiled.

H. Cold-Rolled Carbon Steel Sheet: ASTM A 366, oiled.

I. Galvanized Steel Sheet: ASTM A 526, with G90 hot-dip process zinc coating complying with ASTM A653.

J. Steel Hollow Structural Sections (Round, Square, or Rectangular): ASTM A 500, Grade B; or ASTM A 500, Grade C.

K. Cold-Drawn Steel Tubing: ASTM A 512, buttwelded, cold-finished carbon steel tubing, sink drawn and stress relieved.

L. Cast Iron Castings: ASTM A 48, gray iron castings, Class 30.

M. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.

N. Steel Castings: ASTM A 27, grade and class as required by use of item.

O. Steel Pipe: ASTM A 53, type as selected, Grade A; black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise shown or specified.

P. Rolled Steel Floor Plate, Raised Pattern: ASTM A 786; raised herringbone pattern unless otherwise indicated.

Q. Stainless Steel: Type 302/304; ASTM A 666 for plate, sheet and strip; ASTM A 276 for bars and shapes; ASTM A 269 for tubing.

R. Anchors: Except where shown or specified, select anchors of type, size, style, grade, and class required for secure installation of metal fabrications. For

exterior use and where built into exterior walls, anchors shall be galvanized or of corrosive-resistant materials.

1. Threaded-Type Concrete Inserts: Galvanized ferrous casting, internally threaded to receive 3/4 inch diameter machine bolt; either malleable iron or cast steel.
2. Wedge-Type Concrete Inserts: Galvanized box-type ferrous casting, designed to accept 3/4 inch diameter bolt having special wedge-shaped head; either malleable iron or cast steel.
    a. Bolts: Carbon steel bolts having special wedge-shaped heads, nuts, washers and shims.
3. Slotted-Type Concrete Inserts: Galvanized 1/8 inch thick pressed steel plate complying with ASTM A 283; box-type welded construction with slot designed to receive 3/4 inch diameter square head bolt and with knockout cover.
4. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent test agency.
    a. Carbon Steel: Zinc-Plated; ASTM B 633, Class Fe/Zn 5.
    b. Stainless Steel: Bolts, Alloy Group 1 or 2; ASTM F593, Nuts; ASTM F 594.

S. Fasteners: Except where shown or specified, select fasteners of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, fasteners shall be galvanized.

1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
2. Stainless Steel Fasteners: ASTM A 666; Type 302/304 for interior Work; Type 316 for exterior Work; Phillips flathead (countersunk) screws and bolts for exposed Work unless otherwise specified.
3. Eyebolts: ASTM A 489.
4. Machine Bolts: ASME B18.5 or ASME B18.9, Type, Class, and Form as required.
5. Machine Screws: ASME B18.6.3.
6. Lag Screws: ASME B18.2.1.
7. Wood Screws: Flat head, ASME B18.6.1.
8. Plain Washers: Round, ASME B18.22.1.
9. Lock Washers: Helical, spring type, ASME B18.21.1.
10. Toggle Bolts: Spring Wing Type; Wing AISI 1010, Trunion Nut AISI1010 or Zamac Alloy, Bolt Carbon Steel ANSI B18.6.3.

T. Shop Paint (General): Universal shop primer; fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

U. Shop Paint for Galvanized Steel: Epoxy zinc-rich primer; complying with MPI#20 and compatible with topcoat.

V. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

W. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

X. Bedding Mortar:
1. Cement Grout: Portland cement complying with ASTM C 150, Type I or III, and clean uniformly graded natural sand complying with ASTM C 404, size No. 2; mixed at a ratio (by volume) of 1.0 part cement to 3.0 parts sand, with only the minimum amount of water required for placement and hydration.
2. Shrink-Resistant Grout (Ferrous): Factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:
   a. Embeco 636 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122 (800) 227-3350.
   b. Ferrolith G-NC by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.
   c. Ferro-Grout by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NB 68152, (800) 362-3331.
   d. Vibra-Foil by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.
3. Shrink-Resistant Grout (Non-Staining): Factory-packaged, non-ferrous mortar grouting compound selected from the following:
   a. Masterflow 713 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122 (800) 227-3350.
   b. Sonogrout by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.
   c. Five Star Grout by Five Star Products, Inc., 425 Stillson Rd., Fairfield, CT 06430, (800) 243-2206.
   d. Crystex by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NB 68152, (800) 362-3331.
   e. Non-Corrosive, Non-Shrink Grout by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.

2.02 MISCELLANEOUS FRAMING AND SUPPORTS

A. Fabricate metal framing and supports to support related items required by the Work. Fabricate of welded construction unless otherwise indicated. Preassemble to largest extent possible.

B. When required to be built into other Work, equip units with integral anchors spaced not more than 24 inches on center.

C. Galvanize exterior steel framing and supports.

2.03 MISCELLANEOUS STEEL TRIM

A. Fabricate trim of shapes, sizes, and profiles shown, with continuously welded joints and smooth exposed edges, unless otherwise indicated or approved. Use concealed field splices wherever possible. Furnish necessary cutouts, fittings, and anchorages.

B. Galvanize exterior steel trim.

2.04 LOOSE BEARING PLATES

A. Steel plates fabricated flat, free from warp or twist, and of required thickness and bearing area. Drill plates as required for anchor bolts and for grouting access. Furnish bearing plates where shown and where required for steel items bearing on masonry or concrete construction.

2.05 LOOSE LINTELS

A. Structural steel shape lintels, fabricated for openings and recesses in masonry walls and partitions as indicated. Loose lintels bearing on masonry or concrete shall have a minimum end bearing length of 6 inches at each end, unless otherwise shown.

B. Galvanize lintels to be installed in exterior walls.

2.06 STEEL PIPE RAILINGS AND HANDRAILS

A. Fabricate railings and handrails of 1-1/2 inch (nominal) diameter steel pipe, unless otherwise shown.

B. Railings: Unless otherwise shown, railings shall consist of top rail and intermediate rails, with posts spaced not more than 4 feet oc. Close ends of rails which do not terminate with a flange or continuous return.
   1. Space rails so that a sphere 4 inches in diameter cannot pass through the openings between the rails.
   2. Join posts, rails, and corners by one of the following methods:
      a. Flush-type steel railing fittings, welded and ground smooth, with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews.
      b. Coped and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding joints smooth. Butt railing splices and reinforce by a tight-fitting interior pipe sleeve not less than 6 inches long secured in place.
   3. Railings may be bent at corners instead of joining, provided the bends are uniformly formed in jigs, with cylindrical cross-section of pipe maintained throughout the entire bend.
   4. Unless otherwise shown, fabricate railings and accessories as necessary to secure posts and rail ends to construction as follows:
      a. Anchor posts in concrete by means of post sleeves preset into the concrete.

b. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.
c. Anchor rail ends into concrete and solid masonry with round steel flanges welded to rail ends and anchored into the wall construction with expansion anchors.
d. Anchor rail ends to steel with oval or round steel flanges welded to rail ends and bolted or welded to the steel supporting members.

5. Post Sleeves: Galvanized steel pipe not less than 6 inches long, and having an inside diameter not less than 1/2 inch greater than the outside diameter of the pipe post. Sleeve shall have a plate closure, sized to extend not less than 1 inch beyond the outside diameter of the sleeve, secured to the bottom of the sleeve.
   a. Cover Flange: Round steel flange, sized to closely fit post and cover the sleeve.
6. Fabricate removable railing sections as indicated on the Drawings.
7. Kickplates: Flat steel bars 3/16 inch thick by not less than 6 inches high. Secure kickplates as shown.

C. Handrails: Pipe handrails shall be secured to walls by means of wall brackets, and shall have a wall return fitting at each end of handrails unless otherwise shown.
1. Wall Brackets: Malleable iron castings, with 3 inches projection from the finish wall surface to the center of the handrail, and with the wall plate portion of the bracket drilled to receive one 3/8 inch diameter bolt. Brackets shall be located approximately 6 inches from each end of handrails and intermediate brackets equally spaced at intervals not exceeding 5 feet oc. Fabricate wall brackets to secure to wall construction as follows:
   a. Anchor into concrete and solid masonry with expansion anchors.
   b. Anchor into hollow masonry and stud partitions with toggle bolts having square heads.
2. Wall Return Fittings: Cast iron castings, flush-type, with the same projection as specified for wall brackets.

D. Galvanize all exterior railings and handrails, and interior railings and handrails where indicated on the Drawings, including pipe, flanges, fittings, brackets, fasteners, and other ferrous metal components.

2.07 SAFETY NOSINGS

A. Nosings: Cast, abrasive non-slip type, of profiles indicated, extending full length of concrete treads or other concrete edges to be protected unless otherwise indicated. Equip each nosing with integrally cast, welded, or riveted anchors located not more than 4 inches from each end of nosing and intermediate anchors spaced not over 15 inches oc. Abrasive grain shall be integrally cast into the wearing surface.

FILL IN BLANK SPACE IN SUBPARAGRAPH BELOW WITH CAST IRON, CAST ALUMINUM, CAST BRONZE, OR CAST NICKEL-BRONZE AS REQUIRED. DELETE UNDERLINE BEFORE ENTERING THE INFORMATION.

1. Metal: _____.

2. Tread Nosing Units: 4 inches wide x 5/16 inch thick, with 1 inch minimum deep protective front lip.
3. Curb Bar Nosing Units: 2-1/2 x 2-1/2 x 1/2 inch thick.
4. Curb Bar Nosing Units: 1-1/2 x 1-1/2 x 3/8 inch thick.
5. Surface Design: Cross-hatched abrasive.
6. Surface Design: Fluted abrasive.
7. Surface Design: Plain abrasive.

2.08 FABRICATION

A. Use materials of size and thickness indicated. If not indicated, use material of required size and thickness to produce adequate strength and durability for the intended use of the finished product. Furnish suitable, compatible anchors and fasteners to support assembly.

B. Fabricate items to be exposed to view of material entirely free of surface blemish, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove surface blemishes by grinding or by welding and grinding prior to cleaning, treating, and finishing. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown.

C. Joints: Fabricate accurately for close fit. Weld exposed joints continuously unless otherwise indicated or approved. Dress exposed welds flush and smooth.

D. Connections: Form exposed connections with flush, smooth, hairline joints. Use concealed fasteners wherever possible. Use Phillips flathead (countersunk) bolts or screws for exposed fasteners, unless otherwise shown or specified.
1. Furnish flat washer under connections requiring raised bolt heads.
2. Furnish lock washer under nuts when through-bolting occurs.

E. Punch, reinforce, drill, and tap metal Work as required to receive hardware and other appurtenant items.

F. Galvanizing:
1. In addition to specific items specified or noted to be galvanized, galvanize items attached to, embedded in, or supporting exterior masonry (including interior wythe of exterior masonry walls) and concrete Work.
2. Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:
   a. ASTM A 123 for plain and fabricated material, and assembled products.
   b. ASTM A 153 for iron and steel hardware.

G. Shop Painting:

1. Cleaning Steel: Thoroughly clean all steel surfaces. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning". Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 "Hand Tool Cleaning", SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".
2. Galvanized Items:
   a. Galvanized items which are to be finish painted under Section 099101 shall be rinsed in hot alkali or in an acid solution and then in clear water.
   b. Welded and abraded areas of galvanized surfaces shall be wire brushed and repaired with a coating of cold galvanizing compound.
3. Apply one coat of shop paint to all steel surfaces except as follows:
   a. Do not shop paint steel surfaces to be field welded and steel to be encased in cast-in-place concrete.
   b. Apply 2 coats of shop paint, before assembly, to steel surfaces inaccessible after assembly or erection, except surfaces in contact.
   c. Do not paint galvanized items which are not to be finished painted under Section 099101.
4. Apply paint and compound on dry surfaces in accordance with the manufacturer's printed instructions, and to the following minimum thickness per coat:
   a. Shop Paint (General): 4.0 mils wet film.
   b. Shop Paint for Galvanized Steel: 3.0 mils wet film.
   c. Cold Galvanizing Compound: 2.0 mils dry film.

PART 3 EXECUTION

3.01 PREPARATION

A. Temporarily brace and secure items which are to be built into concrete, masonry, or similar construction.

B. Isolate non-ferrous metal surfaces to be permanently fastened in contact with ferrous metal surfaces, concrete, or masonry by coating non-ferrous metal surface with bituminous mastic, prior to installation.

3.02 INSTALLATION

A. Fit and set fabricated metal Work accurately in location, alignment, and elevation. Securely fasten in place. Cut off exposed threaded portion of bolts flush with nut.

B. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar or grout.

C. Attached Work: Fasten to concrete and solid masonry with expansion anchors and to hollow masonry with toggle bolts in cells, unless otherwise indicated. Drill holes for fasteners to exact required size using power tools.

D. Railings: Adjust railings prior to securing in place to insure alignment and proper matching at joints. Plumb posts in each direction. Secure posts and rail ends to construction as follows:

1. Anchor posts in concrete with post sleeves preset into the concrete. After the posts have been inserted into the sleeves, fill the annular space between post and sleeve solid with molten lead or an exterior quick-setting hydraulic cement. Cover anchorage joint with a cover flange.
2. Anchor posts to steel with steel flanges, angle type or floor type as required. Weld flanges to posts, and bolt to the steel supporting members.
3. Anchor rail ends to concrete and masonry with round steel flanges. Weld flanges to rail ends, and anchor into the wall construction with expansion anchors.
4. Anchor rail ends to steel with steel oval or round flanges. Weld flanges to rail ends, and weld or bolt to the steel supporting members.

END OF SECTION

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum railings.

B. Related Requirements:

1. Section 057300 "Decorative Metal Railings" for ornamental railings fabricated from pipes and tubes and guard-infill metals.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of mechanically connected railings.
2. Fasteners.
3. Post-installed anchors.
4. Handrail brackets.
5. Shop primer.
6. Bituminous paint.
7. Nonshrink, nonmetallic grout.
8. Anchoring cement.
9. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 ALUMINUM RAILINGS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

C. Extruded Bars and Tubing: ASTM B221, Alloy 6063-T5/T52.

D. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

E. Plate and Sheet: ASTM B209, Alloy 6061-T6.

2.4 FASTENERS

A. Fastener Materials:

1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for zinc coating.
2. Aluminum Railing Components: Type 304 stainless steel fasteners.
3. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast aluminum, center of handrail 2-1/2 inches from wall.

B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting."

F. Bituminous Paint: Cold-applied asphalt emulsion, complying with ASTM D1187/D1187M.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated on Drawings, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage , but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water.

1. Provide weep holes where water may accumulate.
2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.

I. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay .

J. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

K. Form changes in direction as follows:

1. By bending or by inserting prefabricated elbow fittings.
2. By bending to smallest radius that will not result in distortion of railing member.

L. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

M. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

Q. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

R. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 ALUMINUM FINISHES

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Mill Finish: AA-M12, nonspecular as fabricated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
2. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.
3. For stainless steel railings, weld flanges to post and bolt to supporting surfaces.

3.5 ATTACHING RAILINGS

A. Anchor railing ends to concrete and masonry with flanges connected to railing ends and anchored to wall construction with anchors and bolts.

B. Attach handrails to walls with wall brackets , except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt .
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

D. Install railing gates level, plumb, and secure for full opening without interference.

1. Attach hardware using tamper-resistant or concealed means.
2. Adjust hardware for smooth operation.

3.6 REPAIR

A. Touchup Painting:

1. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in

3.7 CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 055213

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Rooftop equipment bases and support curbs.
4. Wood blocking , cants, and nailers.
5. Wood furring and grounds.
6. Wood sleepers.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 313116 "Termite Control" for site application of borate treatment to wood framing.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. OSB: Oriented strand board.

E. Timber: Lumber of 5 inches nominal size or greater in least dimension.

F. Lumber grading agencies, and abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 QUALITY ASSURANCE

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece .
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber:

1. Boards: 19 percent.
2. Dimension Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

3. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Ceiling Joists: Construction or No. 2 grade.

1. Species:
   a. Hem-fir (north); NLGA.
   b. Douglas fir-larch (north); NLGA.

B. Joists, Rafters, and Other Framing by Grade: No. 2 grade.

1. Species:
   a. Hem-fir (north); NLGA.
   b. Douglas fir-larch (north); NLGA.

2.4 ENGINEERED WOOD PRODUCTS

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
2. Modulus of Elasticity, Edgewise: 2,000,000 psi .
3. Horizontal Shear: 285 psi .
4. Tension Parallel to Grain: 1950 psi .

C. Moisture Protection:

1. For western species (Douglas fir/hemlock), factory end and edge seal laminated veneer lumber with opaque moisture barrier.
2. For southern and eastern species (southern yellow pine, yellow poplar), factory seal laminated veneer lumber on face, edge, and ends.

2.5 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:

1. Mixed southern pine or southern pine; SPIB.
2. Spruce-pine-fir; NLGA.

C. Concealed Boards: 15 percent maximum moisture content and the following species and grades:

1. Mixed southern pine or southern pine; No. 2 grade; SPIB.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
2. For pressure-preservative-treated wood, use stainless steel fasteners.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.7 MISCELLANEOUS MATERIALS

A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

D. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 INSTALLATION OF FLOOR JOIST FRAMING

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:

1. Where supported on wood members, by toe nailing or by using metal framing anchors.
2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.

C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.

D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than 2 inches from top or bottom.

E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.

F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.

G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.

H. Provide solid blocking between joists under jamb studs for openings.

I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.

1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

J. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.

1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed and nailed at both ends to joists.

3.5 INSTALLATION OF CEILING JOIST AND RAFTER FRAMING

A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate, and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet , apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 06 12 13 – SUBFLOOR PANEL, 3/4" USG STRUCTO-CRETE® Brand Structural Panels

PART 1 - GENERAL

1.01 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Framing
   2. Fasteners
   3. Underlayment and floor coverings

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. See Section 05 40 00, Cold-Formed Metal Framing
B. See Section 06 10 00, Rough Carpentry

1.03 SYSTEM DESCRIPTION

USG Structural Panel floor system consists of steel joists, trusses or framing members and 3/4" STRUCTO-CRETE® Brand Structural Panels installed with mechanical fasteners. 3/4" STRUCTO-CRETE® Brand Structural Panels are a high-strength reinforced concrete panel typically for use in noncombustible construction, as required by the applicable building codes. Adhesives are not recommended, nor required.

1.04 REFERENCES

A. ICC-ES AC318 – Acceptance Criteria for Structural Cementitious Floor and Roof Sheathing Panels
B. ICC-ES AC319 – Acceptance Criteria for Horizontal Diaphragms Consisting of Structural Cementitious Floor Sheathing Panels Attached to Cold-Formed Steel Framing
C. ASTM A588/A588M – Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
D. ANSI/AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members
E. ANSI/AISI S210 – North American Specification for Cold-Formed Steel Framing – Floor and Roof System Design
F. ANSI/AISI S214 – North American Specification for Cold-Formed Steel Framing – Truss Design
G. ANSI/AISI S230 – Standard for Cold-Formed Steel Framing – Prescriptive Method for One- and Two-Family Dwellings
H. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
I. ASTM E119 – Standard Test Method for Fire Tests of Building Construction and Materials
J. ASTM E136 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C

1.05 SYSTEM REQUIREMENTS

A. Performance Requirements: Fabricate and install systems as indicated:
   1. Floor Framing:
      a. Standard systems:
         i. Floor framing shall be designed with a minimum deflection of L/360, where the Uniform Floor Load is 283 PSF (13.5 kPa) (Allowable) for framing spaced at 16" (406 mm) o.c.
   2. Fasteners:
      a. Follow the selected fastener layout for Screw Patterns, for the design Diaphragm Loads as described in the current Progressive Engineering, Inc.'s Evaluation Report PER-13067, available at 3/4" USG STRUCTO-CRETE® Brand Structural Panels Code Report.

3. Panel Layout:
   a. Follow the 3/4" USG STRUCTO-CRETE® Brand Structural Panels application described in the current Progressive Engineering, Inc. Evaluation Report PER-13067.

B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.
Note: Fire-resistance ratings may require lighter gauge framing than that required for Shear- or Uniform-Loading. In this case, the gauge and joist depth must be selected by the strongest governing factor.

C. Noncombustible Ratings: Where noncombustible assemblies are required, provide materials and application procedures identical to those tested according to ASTM E136, "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C.
Note: Materials with modified ASTM E136-16 evaluations are not acceptable.

D. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) in accordance with ASTM E90 and/or Impact Insulation Class (IIC) in accordance with ASTM E492 specified. Refer to 3/4" USG STRUCTO-CRETE® Brand Fire & Acoustic Manual - SCP100 for specific acoustical assemblies and performance ratings.

1.06 DELIVERY, STORAGE AND HANDLING

A. Delivery:
1. Deliver material to site promptly without undue exposure to weather.
2. Deliver in manufacturer's unopened containers, pallets, or panels fully identified with name, Brand, type, and grade.

B. Storage:
1. Store above ground in dry, ventilated space.
2. Protect materials from soiling, exposure, and damage.
3. If stored outside, material shall be covered with waterproof tarps.
Note: If 3/4" USG STRUCTO-CRETE® Brand Structural Panels are frozen while stored outdoors, allow to thaw-out naturally. Do not use salts or fertilizers to defrost the panels or attempt to pry them apart.
4. Panels must be stored over stable soil or other surface. Soil or surface must be able to carry the load of the stored pallet(s). Each 20-piece pallet weights 3,500 lbs (1542 kg). It is recommended that the load carrying capacity of the floor or surface be verified before storing panels.
5. Pallets must not be stacked out of alignment by more than +/- 1/2" (13 mm), measured on any side of the pallet.

1.09 PROJECT CONDITIONS

A. Environmental Requirements:
1. When mechanically fastened, do not install 3/4" USG STRUCTO-CRETE® Brand Structural Panels when ambient or conditioned temperature is below 0 °F (-18 °C).
2. Prior to the application of finished flooring, 3/4" USG STRUCTO-CRETE® Brand Structural Panels must be conditioned at the same temperature as required for the finished flooring for at least 48 hours.
3. Do not apply finished flooring over 3/4" USG STRUCTO-CRETE® Brand Structural Panels when wet, frozen or with surface frost.
Note: If installed panels have snow or ice, do not use salts or defrosting agents, sand is recommended over slippery surfaces.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

A. Structural Concrete Panel: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL.

2.02 MATERIALS

A. Structural Concrete Panel:

1. 3/4" USG STRUCTO-CRETE® Brand Structural Panels, a noncombustible structural subfloor panel manufactured in accordance with Acceptance Criteria AC318.

a. Panel Dimensions:

i. Thickness: 3/4" (19 mm)

ii. Width: 4' (1220 mm)

iii. Lengths: [8' (2440 mm)] or [6' (1829 mm)] or [6'-8" (2032 mm)]

iv. Long Edges: Tongue and Groove

b. Panel Properties:

i. Density: 75 lb/ft^3 (1200 kg/m^3) tested in accordance with ASTM C1185

ii. Weight: 5.0 lbs/ft^2 (24.4 kg/m^2) tested in accordance with ASTM D1037 at a thickness of 3/4" (19 mm)

iii. Noncombustibility: Pass tested in accordance with ASTM E136

iv. Surface Burning Characteristics: 0 Flame Spread / 0 Smoke Developed tested in accordance with ASTM E84

v. Mold Resistance: 10 tested in accordance with ASTM D3273
0 tested in accordance with G21

B. 3/4" USG STRUCTO-CRETE® Brand Structural Panels Recommended Fasteners:

a. In accordance with PER-13067 (Subfloor) and PER-14076 (Roof Deck), PER-15092 (Foundation Wall), and ESR-1792 (Subfloor).

b. Use only fasteners recommended by USG. Go to www.USGSCP95.com for the current list of recommended fasteners.

c. Install using the recommended spacing and distance from the Ends (square cut) and Edges (tongue & groove) of the panel.

d. Any length of USG recommended fasteners may be used but do not use a larger size fastener unless specified by the structural engineer.

C. Floor Coverings and Underlayment:

1. Follow floor covering manufacturers' installation procedures.

D. Sound Attenuation:

1. Reference 3/4" USG STRUCTO-CRETE® Brand Fire & Acoustic Manual - SCP100 for sound system designs.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates, adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Steel framing to receive the 3/4” USG STRUCTO-CRETE® Brand Structural Panels shall be structurally sound, free from bows, twists, or other malformations and in general compliance with local building code requirements. Damaged framing shall be replaced before installation of 3/4” USG STRUCTO-CRETE® Brand Structural Panels.

3.02 GENERAL INSTALLATION REQUIREMENTS

A. Cold-Formed Steel Framing:

1. The floor joists and other floor framing components must be designed to meet the strength and deflection criteria specified in the contract documents.
2. The attachment flange or bearing edge for cold-formed steel must be a minimum 1-5/8" (41 mm) wide, 2” preferred, with at least 3/4" (19 mm) of the panel bearing on the supporting flange.
3. The size of the cold-formed steel framing flange required will vary based on the specified mil thickness/gauge and fastener selected.
4. Cold-formed steel framing thickness and size is always based on diaphragm capacity but must be a minimum 43 mil (18 gauge) and spaced no greater than 24" (610 mm) o.c. for up to 450 plf. When significant diaphragm capacity is required, 54 mil (16 gauge) may be required.
5. Joist bearing shall be provided at the foundation that is uniform and level.
6. Cold-formed steel joists shall be located directly over bearing studs or a header installed at the top of the bearing wall to distribute the load.
7. Joist framing must be perpendicular to rim joists.
8. On steel framing, a web stiffener shall be provided at reaction points and/or concentrated loads as specified in the contract documents. End blocking shall be provided where joist ends are not otherwise restrained from rotation.
9. Additional joists shall be provided under parallel partitions and around all floor openings that interrupt one or more spanning members. Framing must be properly fastened to the supporting walls or structure.
10. All blocking or bridging must be installed prior to the installation of 3/4” USG STRUCTO-CRETE® Brand Structural Panels.
11. Framing must be of good quality, free of bows, twists, or other malformations.

B. Hot-Rolled Steel Framing:

1. The floor joists and other floor framing components must be designed to meet the strength and deflection criteria specified in the contract documents.
2. Framing shape and size is always based on diaphragm capacity.
3. Hot-rolled steel framing shall have a 3” (76 mm) or larger bearing surface suitable for fastener insertion and panels must bear a minimum of 1 1/4” (32 mm) on the framing member.
4. Framing bearing shall be provided at the foundation that is uniform and level.
5. Joist framing must be perpendicular to support beams.
6. Additional framing members shall be provided under parallel partitions and around all floor openings that interrupt one or more spanning members. Framing must be properly fastened to the supporting walls or structure.
7. All blocking or bridging must be installed prior to the installation of 3/4” USG STRUCTO-CRETE® Brand Structural Panels.
8. Framing must be of good quality, free of bows, twists, or other malformations.

C. 3/4" USG STRUCTO-CRETE® Brand Structural Panels:

1. This product may contain respirable crystalline silica. Refer to OSHA Rule 29 CFR 1926.1153 for specific details about limiting worker exposure to respirable silica.
2. The panels shall be cut to size with a circular saw equipped with carbide-tipped cutting blade and a dry dust industrial HEPA vacuum collection device for control of dust and silica. Wear safety glasses and a NIOSH-approved dust mask when cutting the panel. Collected dust shall be disposed in a safe manner and in compliance with local, state, and federal ordinances.
3. 3/4" USG STRUCTO-CRETE® Brand Structural Panels shall be installed with the long edges (tongue & groove) perpendicular to the framing. If primary framing direction changes, removal of the tongue from the first row of panels oriented in the new direction will be necessary for proper fastening. Care should be taken to insure sufficient framing flange is available for fastening the panels in the new orientation.
4. The fire, sound, and structural ratings listed in the 3/4" USG STRUCTO-CRETE® Brand Fire & Acoustic Manual - SCP100 for the 3/4" STRUCTO-CRETE® Brand Structural Panel systems are based on fastener attachment only, no adhesives.
5. Begin panel installation by snapping a line across the joists parallel to the rim joist at a distance equal to the width of the first panel being placed. Given that panel width is 48" (1,220 mm), plan the layout so the first and last panel row width is a minimum of 24" (610 mm) wide. In the case where the row width is less than 24" (610 mm) wide, panels shall be blocked on all edges by framing (strapping is not sufficient).
6. Ensure that all supporting members are free of debris before placing panels. Place the cut edge or tongue along the rim joist. Place each panel across three or more supports [minimum two-span condition]. Less than full length panels at the end of a row may span a single framing opening. Cut panels to length as needed to ensure that the butt end of the panel is centered on the framing member. Install panels in a direction that ensures that the butt end falls over the open side of the joist. This will help keep adjacent ends in the same place.
7. 3/4" USG STRUCTO-CRETE® Brand Structural Panels shall be fastened following the fastening schedule listed in the contract documents. Begin fastening at one end and fan out across the panel. Do not fasten all the corners first. After the installation of one complete row, begin the next row. Slide panels together so that the tongue of the panel being installed fits into the groove of the installed panel. If there is construction debris lodged inside the groove, do not force the tongue into the clogged groove. Clean the plugged groove with a stiff bristle brush to dislodge the trapped debris. Do not gap the panels. Install the second panel and all subsequent panels in a similar manner to complete the row. Install all rows in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows. Less than full length panels at the end of a row may be staggered by a single support.
8. Penetrations in the panels should be made before installing the panel whenever possible. If a penetration is required after the panel is installed, set the depth of the saw blade to ensure that the framing is not damaged. Support the ends and edges of any penetrations with framing if they are greater than 6" (153 mm) in any direction. Refer to 3/4" USG STRUCTO-CRETE® Brand Structural Panels Subfloor Installation Guide - SCP14 for additional information.
9. Ensure panel is flush with supporting member, drive fasteners so the heads are flush with the surface of the board. Go to www.USGSCP95.com for the current list of recommended fasteners.
10. Construction Traffic Protection – prior to floor finishing, place minimum 3/8" (9.525 mm) thick plywood sheathing materials on the floor in high traffic areas over newly installed 3/4" USG STRUCTO-CRETE® Brand Structural Panels (i.e., additional 3/4" USG STRUCTO-CRETE® Brand Structural Panels or plywood). ¼" plywood may be used in lieu of 3/8" material provided it is fastened at all four corners to prevent shifting and curling. Thicker protecting material may be required if heavier loads are expected or work is to be performed that may damage installed 3/4" USG STRUCTO-CRETE® Brand Structural Panels.

D. Sound Mat and Underlayments

2. Poured Floor Underlayment:

1) USG Levelrock® Brand or Durock® Brand Underlayment can be poured directly onto 3/4" USG STRUCTO-CRETE® Brand Structural Panels in lieu of a dry underlayment panel.

Note: 3/4" USG STRUCTO-CRETE® Brand Structural Panel joints must be taped, and a primer may be required, prior to underlayment pour.

2) USG Fiberock® Brand Underlayment panels should be secured to 3/4" USG STRUCTO-CRETE® Brand Structural Panels using staples and a modified thin set mortar.

3) Refer to USG Performance Flooring Portfolio – IG2013, along with USG submittal and SDS documents at USG.com for the most recent product data and installation procedures for USG Levelrock® Brand, Durock® Brand, USG Fiberock® Brand Underlayment products.

E. Floor Finish:

1. Leftover material shall be removed from the job site.
2. Remove all foreign material from the floor surface and vacuum all dust from the surface.
3. Before the application of floor finish materials, ensure that all panels are properly fastened, with the fastener head driven flush or slightly below the surface of the panels. If required butt joints and T&G joints shall be filled with an elastomeric patching compound [*cement-based compounds, can crack*].
4. Direct application of bonded floor finishes to 3/4" USG STRUCTO-CRETE® Brand Structural Panels is not recommended.
5. If 3/4" USG STRUCTO-CRETE® Brand Structural Panels are left bare in extremely-light traffic areas, it is recommended that you seal the panels with a concrete sealer to seal the porous surface.

END OF SECTION

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Roof sheathing.

1.3 INFORMATIONAL SUBMITTALS

1.4 QUALITY ASSURANCE

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations , tie-ins to installed waterproofing , and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products are to meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 WALL SHEATHING

A. Plywood Sheathing, Walls: , Exterior, Structural I sheathing.

1. Span Rating: Not less than 20/0 .
2. Nominal Thickness: Not less than 1/2 inch.

B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M, Type X, coated fiberglass mat gypsum sheathing with integral weather-resistant barrier and air barrier complying with ASTM E2178.

1. Thickness: 5/8 inch thick.
2. Size: 48 by 96 inches for vertical installation.
3. Edges: Square.
4. Flashing and Transitions Strips: As acceptable to sheathing manufacturer.
5. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference when tested in accordance with ASTM E2178.
6. Vapor Permeance: Minimum 20 perms when tested in accordance with ASTM E96/E96M, Desiccant Method, Procedure A.
7. Sheathing Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. when tested in accordance with ASTM E2357.
8. Fire Propagation Characteristics: Complies with NFPA 285 testing as part of an approved assembly.
9. UV Resistance: Can be exposed to sunlight for 30 days in accordance with manufacturer's written instructions.
10. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by sheathing manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

C. Fiberboard Sheathing: ASTM C208, Type IV, Grade 2 (Structural) cellulosic fiberboard sheathing with square edges, 25/32 inch thick.

2.4 ROOF SHEATHING

A. Plywood Sheathing, Roofs: , Exterior, Structural I sheathing.

1. Span Rating: Not less than 24/0 .
2. Nominal Thickness: Not less than 15/32 inch .

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M .
2. For roof wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.

B. Nails, Brads, and Staples: ASTM F1667.

C. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

2.6 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:
   a. Nail to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch apart at edges and ends.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to wood framing with screws.
2. Fasten gypsum sheathing to cold-formed metal framing with screws.
3. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.

4. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints in accordance with sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:

1. Install accessory materials in accordance with sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.
   a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   b. Install transition strip on roofing membrane or base flashing, so that a minimum of 3 inches of coverage is achieved over each substrate.
2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip , so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
   a. Transition Strip: Roll firmly to enhance adhesion.
   b. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
7. Seal top of through-wall flashings to sheathing with an additional 6-inch- wide, transition strip.
8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches beyond repaired areas in strip direction.

END OF SECTION 061600

SECTION 06 16 13 – STRUCTURAL INSULATED SHEATHING WITH FACTORY APPLIED AIR AND WATER-RESISTIVE MEMBRANE COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural Insulated Sheathing exterior wall panels, manufacturer, components, and Accessories

1.2 RELATED SECTIONS

A.
B. Section 05 40 00 – Cold Formed Metal Framing
C. Section 07 21 00 – Thermal Insulation

1.3 REFERENCE STANDARDS

A. ASTM E84 - “Standard Test Method for Surface Burning Characteristics of Building Materials”.
B. ASTM D137-12 - “Standard Test Method for Evaluating Properties of Wood based Fiber and Particle Panel Materials”, Section 15: Nail Head Pull Through.
C. ASTM E2357 - “Air Leakage of Building Assemblies”.
D. ASHRAE 90.1-2013 - “Energy Standard for Buildings Except Low-Rise Residential Buildings”.
E. ASTM E283-04 (2012) - “Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen”.
F. ASTM E331-00 (2016) - “Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”.
G. Testing Application Standard (TAS) 202-94 - “Impact & Nonimpact Resistance Building Envelope Components using Uniform Static Air Pressure”.
H. Testing Application Standard (TAS) 203-94 - “Criteria for Testing Products Subject to Cyclic Wind Pressure Loading”.
I. ASTM E72-05 - “Standard Test Method of Conducting Strength Tests of Panels for Building Construction”.
J. ASTM C518-17 - “Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter”.
K. ASTM D1929-12 - “Standard Test Method for Determining Ignition Temperature of Plastics.
L. ASTM E96-13 - “Test Method for Water Vapor Transmission of Materials”.
M. ASTM C1304-08 (2013) - “Standard Test Method for Assessing the Odor Emission of Thermal Insulation Materials”.
N. ASTM C1338-14 - “Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings”.
O. ASTM D1761 - “Standard Test Methods for Mechanical Fasteners in Wood” modified for Shear”.
P. NFPA 285 (2012) - “Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components”.
Q. ASTM E119-07 - “Standard Test Methods for Fire Tests of Building Construction and Materials”.

1.4 SUBMITTALS

A. See Section 10 30 00 – Administrative Requirements for submittal procedures.
B. Manufacturer’s Product Data: Submit data sheets for structural insulating sheathing and accessories. Include instructions for handling, storage, installation, and protection.
C. Manufacturer’s Installation Instructions: Indicate special handling criteria, installation sequence, cleaning procedures, and standard installation procedures.
D. Manufacturer’s demonstrated compliance with NFPA 285 assembly.
E. Sample product warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures and assembles structural insulated sheathing in its own fabrication and owned facilities.
B. Field Quality Control Plan:
   1. Visually inspect fasteners, flashings, and waterproofing.
   2. Photographically document observations and maintain record of observations.
C. Installer Qualifications: Company specializing in performing the work of this Section with minimum [3] [4] [5] years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Transport and handle items in accordance with manufacturer's instructions.
B. Coordinate deliveries in order to avoid delay in, or impediment of, progress of the Work.
C. Store packaged materials in original containers with seals unbroken and labels, including grade seal, intact until time of use, in accordance with manufacturer's instructions. Do not stack.
D. Store installation system materials in a dry location and handle in a manner to prevent chipping, breakage, and contamination.
E. Store ArmorWall structural insulating sheathing boards off ground, under cover, and keep dry. Pallets shall sit on even gravel or concrete surface when able.
F. Maximum panel stack height thirty (30) panels. Do not double stack pallets.
G. Long term panel storage shall be kept in a warehouse condition.
H. Protect latex additives, organic adhesives, epoxy adhesives and sealants from freezing or overheating in accordance with manufacturer's instructions; store at room temperature when possible.
I. Protect insulated panels from prolonged UV and weather exposure prior to installation. Edges of panels shall remain covered in factory wrapped packaging prior to installation. Outdoor storage prior to installation requires a waterproof tarpaulin and elevated storage above ground level a minimum of four (4) inches if removed from factory pallet shipping platform.

1.7 SEQUENCING

A. Coordinate with the installation of thermal insulation and steel framing as specified in Section 07 21 00 and Section 05 40 00.
B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
C.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
B. Sheathing panels may be installed at any temperature.
C. Special consideration shall be followed for accessory sealants. Follow manufacturer's instructions for temperature limitations on seam sealant requirements.

1.9 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide manufacturer's Limited Ten-Year Warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. DuPont de Nemours, Inc: Wilmington, DE 19898; www.armorwall.dupont.com; 1-833-338-7668.
   Email: armorwall.customerservice@dupont.com
B. Substitutions: permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 INSULATED SHEATHING

A. ArmorWall Plus:
   1. Type: UL Classified and Audited Production:
      a. Magnesium Oxide (MgO) Board Facer; 1/2" (12 mm) thickness.
   2. Fused Rigid Foam Insulation:
      a. Class 1 Rated Urethane Insulation.
      b. Fused directly to rear face of sheathing layer.
         1) Laminations are not acceptable.
      c. Closed Cell Content equal to or greater than 90%.
   3. Air and Water-Resistive Barrier:
      a. Factory applied vapor permeable:
         1) ASTM E96 Method B Water Vapor Transmission: 18 perms at 10 mils.
         2) ASTM E2178 Air Permeance: 0.0005 cfm/sf at 1.57 psf.
   4. Panel Size:
      a. 4 feet by 8 feet (1220 mm by 2440 mm).
   5. Thickness / R-Value per ASTM C518:
      a. 2 inches (50.8 mm) composite thickness with R-Value of R-10.
      b. 2 ¾ inches (69.85 mm) composite thickness with R-Value of R-15.
      c. 3 ¾ inches (95.25 mm) composite thickness with R-Value of R-21.

2.3 PANEL FASTENERS

A. Fasteners shall be approved ArmorWall panel fasteners. Fasteners are corrosion resistant type with oversized heads. Length of fasteners shall be as determined by the panel manufacturer.
   1. ArmorWall panels require Concealor Low Profile Fasteners #14-13 DP1 with Tri-Seal Long-Life Coating.
      a. For use in 18-gauge or higher steel:
         1) Minimum fastener penetration of through the steel with a minimum of three (3) threads showing on the opposite face.
      b. For use in wood frame members:
         1) Minimum of one-inch embedment into wood substrate.
      c. For use in concrete substrates:
         1) Pre-drill panel and concrete substrate using a 3/16" (0.187") masonry drill bit.
         2) Install fastener using a 2,000 RPM hammer drill.
         3) Minimum embedment depth into substrate of one-inch.
         4) Do not exceed one one-half inch embedment.
   2. ArmorWall panels require Concealor Low Profile Fasteners ¼-14 DP3 with Tri-Seal Long-Life Coating.
      a. For use in 18-gauge steel to ¼" plate steel:
         1) Minimum fastener penetration of through the steel with a minimum of three (3) threads showing on the opposite face.

2.4 ACCESSORIES

A. Joints and Fastener Heads shall be covered with manufacturer required sealant and/or coating.
   1. ArmorSeal Sealant gunnable grade polyether sealant.
B. Rough Openings in Fire Rated Assemblies and Walls
   1. ArmorBoard Plus returns factory sized to width of full rough opening depth.
   2. ArmorBoard Plus shall be field trimmed to width of full rough opening depth.
C. Window and Door Sills shall be coated with manufacturer required coating.
   1. ArmorSeal Sealant trowel grade polyether sealant.
   2.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.
B. Do not begin installation until exterior walls have been properly prepared.
C. Verify that all exterior wall assembly construction has been completed to the point where the insulation may correctly be installed.
D. Verify built-in items, penetrations and rough openings are correct and properly located.

3.2 PREPARATION

A. Protect surrounding area from possible damage during installation of structural insulated sheathing.
B. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
C. If deficiencies exist, consult Architect. Correct deficiencies in accordance with manufacturer's recommendations.
D. Beginning installation constitutes Contractor's acceptance of existing conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.
E. Exposed insulation must always be protected from open flame and kept dry.
F. Fasten structural insulated sheathing to the structural base wall.
G. Exterior wall insulation layer is not intended to be left exposed for extended periods of time in excess of fifteen (15) days without adequate protection. If extended exposure is anticipated all exposed foam surfaces including corners, window and door openings, should be covered with a compatible waterproof tape. Contact DuPont for guidance on exposed materials.
H. Install ArmorSeal sealant gunnable grade at all fastener heads, seams, inside and outside corners providing a one-inch seal in either direction of each seam or opening.

3.4 FIELD QUALITY CONTROL AND TOLERANCES

A. See Section 01 40 00 – Quality Requirements, for additional requirements.
B. Perform field quality control inspection as specified in Part 1, Quality Assurance.
C. Joint thickness: No gaps greater than ¼ inch allowed without installation of supplemental low-rise field applied foam insulation and backer rod for sealants.

3.5 PROTECTION

A. Protect installed products until completion of project.
B. Cover the top and edges of unfinished wall panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.
C. Wet panels shall be allowed to completely dry prior to application of cladding.
D. Do not leave factory coated air and weather barrier surfaces exposed to weather longer than one hundred eighty (180) days without approval from manufacturer.
E. Repair or replace damaged products before Substantial Completion.

END OF SECTION 06 16 13

SECTION 07 18 00 – TRAFFIC COATINGS, PEDESTRIAN TRAFFIC

PART 1 - GENERAL

1.1 SECTION INCLUDES

1. Polyurethane methacrylate and polymethyl methacrylate technology traffic coatings for pedestrian traffic applications

1.2 RELATED REQUIREMENTS

1. Section 03 31 00 "Cast-in-Place Concrete" for moisture curing of concrete traffic coating substrate.

2. Sections 07 90 00 / 07 95 00 Joint Protection/ Expansion Control

3. Section 07 92 00 "Joint Sealants" for joint sealants and accessories and joint preparation.

1.3 REFERENCES

A. References, General: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section.

B. ASTM International (ASTM): www.astm.org:

1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants

2. ASTM C1127 - Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface

3. ASTM C1193 - Standard Guide for Use of Joint Sealants

4. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating

5. ASTM D4259 - Standard Practice for Abrading Concrete

6. ASTM C957 - Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Integral Wearing Surface

C. International Concrete Repair Institute (ICRI): www.icri.org:

1. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project Site.

1. Review requirements for traffic coating products and installation, including surface preparation, substrate conditions, expansion joints as required, project and manufacturer's details, installation procedures, mockups, testing and inspection

requirements, protection and repairs, and coordination and sequencing of traffic coating work with work of other Sections.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of traffic coating product and expansion joint accessory specified, indicating compliance with requirements.

B. Shop Drawings: Show locations for traffic coating system components. Show details for each type of substrate, movement joints, corners, and edge conditions, including penetrations, transitions, and terminations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Certification of manufacturer's approval of Installer.

B. Warranty: Sample of unexecuted manufacturer and installer special warranties.

C. Field quality control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A manufacturer-approved firm with minimum five years' experience in installation of specified or similar products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of three years' experience installing similar work, and able to communicate verbally with Contractor, Architect, and employees.

1.8 DELIVERY, STORAGE AND HANDLING

A. Accept materials on site in manufacturer's unopened original packaging.

B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges recommended by traffic coating manufacturer.

C. Construction Waste: Store and dispose of packaging materials and construction waste in accordance with requirements of Division 01.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Environmental Limitations: Apply traffic coating within the range of ambient and substrate temperatures recommended by traffic coating manufacturer.

1. Protect substrates from environmental conditions that affect system performance.

2. Do not apply traffic coating)or expansion joint accessories if applicable) to a damp or wet substrate or during snow, rain, fog, or mist.

1.10 SCHEDULING

A. Schedule work so traffic coating system (including expansion joints if applicable) applications may be inspected prior to concealment.

1.11 WARRANTY

A. Applicator: Company specializing in performing the work of this section qualified by system manufacturer for warranted membrane installation. Applicator shall submit the following certification for review:

1. Applicator shall submit documentation from the membrane manufacturer to verify contractor's status as a qualified approved applicator for warranted installations.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which traffic coating manufacturer agrees to furnish traffic coating material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.

1. Access for Repair: Owner shall provide unimpeded access to the Project and the traffic coating system for purposes of testing, leak investigation, and repair,

2. Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original installed cost of the work.

3. Warranty Period: Twenty (20) Years from date of Substantial Completion.

C. Contractor's Warranty to include work in this Section.

1. Warranty Period: Two (2) Years from date of Substantial Completion.

D. Special warranties specified in this article exclude deterioration or failure of traffic coating materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the traffic coating exceeding manufacturer's written specifications for elongation.

2. Mechanical damage caused by outside agents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: Provide traffic coating products manufactured by Tremco, CPG Inc., Commercial Sealants and Waterproofing Division, www.tremcosealants.com, Source Limitations: Provide specified cold-applied products, or approved products meeting or exceeding specified requirements from one of the following:

1. Tremco CPG Inc., Basis-of-Design.

2. Kemper.

3. Pacific Polymers.

2.2 PERFORMANCE REQUIREMENTS

A. General: Traffic coating system shall be capable of performing as a continuous watertight installation and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the structure exterior. Traffic coating shall accommodate normal substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without resultant moisture deterioration.

B. Compatibility: Provide traffic coating system materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by traffic coating manufacturer based on testing and field experience.

2.3 TRAFFIC COATING FOR PEDESTRIAN TRAFFIC, EXTREME WEAR SYSTEM (EWS)

A. Traffic Coating: Manufacturer's polyurethane methyl methacrylate system for extreme exterior exposure conditions, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, waterproofing membrane system with integral wearing surface for pedestrian traffic.

1. Basis of Design Products: Tremco, Inc., Vulkem EWS Pedestrian System

B. Primer: Two-component, chemically curing methyl methacrylate

1. Tremco PUMA Primer

C. Base Coats: Polyurethane methacrylate

1. Tremco PUMA BC or Tremco PUMA BC LM

D. Top Coat: Methyl Methacrylate

1. Tremco PUMA TC

2. Color: As selected by Architect from manufacturer's full range.

E. Aggregate: Manufacturer's standard aggregate for each use indicated of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.

1. 30-50 Mesh silica sand for the primer

2. 16-30 Mesh silica sand for the top coat

2.4 ACCESSORY MATERIALS

A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete traffic coating system meeting performance requirements, and compatible with traffic coating material and adjacent materials.

B. Initiator; Benzoyl Peroxide

1. Tremco PUMA Initiator/Tremco PUMA Initiator+

C. Cleaner; One component methyl methacrylate

1. Tremco PUMA Cleaner

D. Crack and Joint Detailing Coating

1. Tremco PUMA BC LM and/or Tremco PUMA WC with silica

E. Vertical and Ramp Application Coating

1. Tremco PUMA BC R

F. Expansion Joint Pre-compressed or Closed Cell, Monolithic Foam System. Foam Structure Must not Contain Unbonded Foam Laminations;

1. Willseal® Color Coreseal – CM for use in both vehicular and pedestrian traffic applications requiring +/-25% movement capability, closed cell, and a lightweight seal with an integrated waterproofing membrane. For vertical applications refer to Color Coreseal – V.

2. Willseal® FR-H - for use in both vehicular and pedestrian traffic applications requiring hourly fire rated systems. For vertical applications refer to Willseal® FR-V.

3. Willseal® approved accessory sealants as per Willseal application instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying traffic coating materials and system accessories, examine substrate and conditions to ensure substrates are fully cured, smooth, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete surfaces are visibly dry, have cured for time period recommended by traffic coating manufacturer, and are free from release agents, curing agents, laitance, and other contaminates.

2. Test surfaces following cleaning and abrasion specified below.

a. Test for capillary moisture by method recommended in writing by traffic-coating manufacturer.

b. Test for traffic coating adhesion per manufacturer's recommended method.

c. Notify Architect in writing of unsatisfactory conditions.

B. Proceed with installation once unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean, prepare, and treat substrates in accordance with ASTM C1127 and traffic coating manufacturer's written instructions.

1. Remove contaminants, curing compounds, and film-forming coatings from substrates.

2. Remove projections and excess materials and fill voids with manufacturer's recommended substrate patching material.

3. Mechanically abrade concrete surfaces by method of shot blasting to a uniform profile in accordance with ASTM D4259 and meeting ICRI Surface Profile CSP 3. Do not acid etch.

4. Clean prepared surfaces in accordance with ASTM D4258.

B. Protect adjacent finished surfaces by masking. Mask termination point on vertical surfaces. Protect weep holes and drains.

C. For accessory materials, follow manufacturers application instructions.

3.3 TERMINATIONS AND PENETRATIONS

A. Prepare vertical and horizontal surfaces at horizontal to vertical transitions, terminations, joints, and penetrations through traffic coatings in accordance with ASTM C1127 and manufacturer's written instructions, using accessory materials specified.

B. At terminations of traffic coating exposed to traffic, rout 1/4 by 1/4 inch keyway in concrete.

C. Detail Preparation: Prepare non-moving shrinkage cracks, large cracks, construction joints, expansion joints, projections and protrusions, penetrations, drains, and changes in plane in accordance with manufacturer's written instructions and details, .

1. Prepare joints and cracks in substrate in accordance with ASTM C1127 and ASTM D4258 and manufacturer's written instructions.

D. Joint Coating Installation: Comply with manufacturer's written instructions. Allow joint coatings to cure adequately before coating with traffic coating.

1. Provide coating cants at penetrations and at horizontal-to-vertical intersections. Tool coating material to form 45 degree angle transition. Penetrations must be grouted solid at all instances.

2. Rout and fill cracks with coating and tool flush with surface.

3. Feather edges of joint coating applications.

4. Allow coating to cure.

5. Fill expansion joints less than 1” with backer rod and joint sealant contact Tremco for sealant recommendation. Do not apply traffic coating over expansion joints.

6. Fill expansion joints greater than 1” with specified Willseal Expansion Joint material, contact Tremco for sealant recommendation. Do not apply traffic coating over expansion joints.

3.4 PEDESTRIAN TRAFFIC-COATING APPLICATION

A. Primer: Prime surfaces to receive traffic coating system. Allow to cure before proceeding.

B. Start traffic-coating application in presence of manufacturer's technical representative.

C. Apply traffic coating according to manufacturer's written instructions.
   1. Verify that wet film thickness of each coat complies with requirements every 100 sq. ft.

D. Apply number of coats of specified compositions for pedestrian coating at locations indicated on Drawings, per manufactures written installation instructions

E. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated; omit aggregate on vertical surfaces.

F. Cure traffic coatings. Prevent contamination and damage during application and curing stages.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, traffic coating application, protection, and drainage components, and to furnish reports to Architect.

B. Coordination of Testing: Cooperate with testing agency. Allow access to work areas and staging. Notify testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection.

   1. Do not cover Work until testing and inspection is completed and accepted.

C. Reporting: Forward written inspection reports to the Architect within 3 working days of the inspection and test being performed.

D. Correction: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.6 CLEANING AND PROTECTING

A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.

B. Protect traffic coating from damage from subsequent work.

C. Protect layers in the traffic coating system that are not UV stable from exposure to UV light for period in excess of that acceptable to traffic coating manufacturer; replace overexposed materials and retest.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Polyisocyanurate foam-plastic board insulation.
3. Glass-fiber blanket insulation.

B. Related Requirements:

1. Section 061600 "Sheathing" for foam-plastic board sheathing installed directly over wood or steel framing.
2. Section 071416 "Cold Fluid-Applied Waterproofing" for insulated drainage panels installed with plaza deck insulation.
3. Section 075113 "Built-up Asphalt Roofing" Section 075323 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Extruded polystyrene foam-plastic board insulation.
2. Polyisocyanurate foam-plastic board insulation.
3. Glass-fiber blanket insulation.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

B. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type VI : ASTM C578, Type VI, 40-psi minimum compressive strength.

2.3 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Glass-Fiber-Mat Faced : ASTM C1289, glass-fiber-mat faced, Type II, Class 2.

2.4 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Kraft Faced : ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

2.5 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 36 inches in from exterior walls.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.

1. Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. For wood-framed construction, install blankets in accordance with ASTM C1320 and as follows:
   a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
   a. Exterior Walls: Set units with facing placed toward interior of construction .

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

C. Loose-Fill Insulation: Apply in accordance with ASTM C1015 and manufacturer's written instructions.

1. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
2. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Polymer-based exterior insulation and finish system (EIFS).

1. EIFS-clad barrier-wall assemblies that are field applied over substrate.

B. Related Requirements:

1. Section 072419 "Water-Drainage Exterior Insulation and Finish System (EIFS)" for EIFS-clad drainage-wall assemblies.
2. Section 072600 "Vapor Retarders" for wall sheet vapor retarders.
3. Section 072713 "Modified Bituminous Sheet Air Barriers" for self-adhering sheet air barriers composed of bituminous materials applied over sheathing behind mechanically fastened EIFS.
4. Section 072715 "Nonbituminous Self-Adhering Sheet Air Barriers" for self-adhering sheet air barriers composed of nonbituminous polymers applied over sheathing behind mechanically fastened EIFS.
5. Section 072726 "Fluid-Applied Membrane Air Barriers" for fluid-applied, synthetic polymer air barriers applied over sheathing behind EIFS-clad wall assemblies.

C. Products furnished, but not installed, under this Section include connections and other attachment devices for prefabricated panels to be [**cast in concrete**] [**embedded in masonry assemblies**].

1.2 DEFINITIONS

A. Definitions in ASTM E2110 apply to Work of this Section.

B. EIFS: Exterior insulation and finish system(s).

C. IBC: International Building Code.

D. Polymer-Based Exterior Insulation and Finish System: Class PB EIFS, as defined in ASTM E2568.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location>**.

1.4 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory.

B. <Click to insert sustainable design text for material ingredient screening and optimization action plan.>

C. Samples: For each exposed product and for each color and texture specified, [**8 inches square**] <**Insert dimension and shape>** in size.

D. Samples for Initial Selection: For each type of finish-coat color and texture indicated.

1. Include similar Samples of exposed accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For .

B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For EIFS to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator/Erector Qualifications: Certified in writing by EIFS manufacturer as qualified to fabricate and erect manufacturer's prefabricated panel system using skilled and trained workers.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Stack insulation board flat and off the ground.
2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1. Proceed with installation of adhesives or coatings only when ambient temperatures have remained, or are forecast to remain, above 40 deg F for a minimum of 24 hours before, during, and after application. Do not apply EIFS adhesives or coatings during rainfall.

1.10 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Bond integrity and weathertightness.

b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.

2. Warranty coverage includes the following EIFS components:
   a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
   b. Insulation installed as part of EIFS [**, including buildouts**].
   c. Insulation adhesive [**and mechanical fasteners**].
   d. EIFS accessories, including trim components and flashing.
3. Warranty Period: [**Five**] [**10**] <**Insert number>** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

A. <Click here to find, evaluate, and insert list of manufacturers and products.>

B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as tested and compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E2568 and with the following:

1. Weathertightness: Resistant to water penetration from exterior.
2. System Fire Performance: [**Fire-resistance rating of wall assembly**] [**Full-scale multistory fire test**].
3. Structural Performance of Assembly and Components:
   a. Wind Loads:
      1) Uniform pressure of <**Insert lbf/sq. ft.>**, acting inward or outward.
      2) Uniform pressure as indicated on Drawings.
4. Impact Performance: ASTM E2568, [**Standard**] [**Medium**] [**High**] [**Ultra High**] impact resistance [**unless otherwise indicated**].
5. Abrasion Resistance of Finish Coat: Sample consisting of 1-inch- thick EIFS mounted on 1/2-inch- thick gypsum board; cured for a minimum of 28 days and shows no cracking, checking, or loss of film integrity after exposure to 528 quarts of sand when tested in accordance with ASTM D968, Method A.
6. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate; cured for 28 days and shows no growth when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.

B. Performance of Prefabricated Panels: EIFS to be designed as follows and withstand the structural performance indicated for Class PB EIFS and thermal movement limits indicated below without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   a. Temperature Change: [**100 deg F**] <**Insert temperature change>**.

2.3 EIFS MATERIALS

A. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in. in accordance with ASTM E2098/E2098M and the following:

1. Reinforcing Mesh for EIFS, General: Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.
2. Strip-Reinforcing Mesh: Not less than [**3.75 oz./sq. yd.**] [**As recommended by EIFS manufacturer**] <**Insert weight>**.

3. Detail-Reinforcing Mesh: Not less than [**4.0 oz./sq. yd.**] [**As recommended by EIFS manufacturer**] <**Insert weight>**.
4. Corner-Reinforcing Mesh: Not less than [**7.2 oz./sq. yd.**] [**As recommended by EIFS manufacturer**] <**Insert weight>**.

B. Base Coat: EIFS manufacturer's standard mixture complying with [**one of**] the following:

1. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.

C. Water-Resistant Base Coat: EIFS manufacturer's standard waterproof formulation complying with [**one of**] the following:

1. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.

D. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

E. Finish Coat: EIFS manufacturer's [**standard acrylic-based coating**] [**standard acrylic-based coating with enhanced mildew resistance**] [**siliconized acrylic-based coating**] [**elastomeric coating**] <**Insert coating>** complying with the following:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
2. Colors: As selected by Architect from manufacturer's full range.
3. Textures: As selected by Architect from manufacturer's full range.

F. Water: Potable.

G. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D1784 and ASTM C1063.

1. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation, with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
2. Expansion Joint: Closed-cell polyethylene backer rod and elastomeric sealant, 3/4-inch minimum.

2.4 MIXING

A. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials, except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Begin coating application only after surfaces are dry.
2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.

C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 INSTALLATION OF EIFS, GENERAL

A. Comply with ASTM C1397, ASTM E2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate.

3.4 APPLICATION OF SUBSTRATE PROTECTION

A. Flexible-Membrane Flashing: Apply and lap to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.

3.5 INSTALLATION OF TRIM

A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, [**at windowsills,**] and elsewhere as indicated. Coordinate with installation of insulation.

1. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
2. Windowsill Flashing: Use at windows unless otherwise indicated.
3. Expansion Joint: Use where indicated on Drawings.
4. Casing Bead: Use at other locations.
5. Parapet Cap Flashing: Use where indicated on Drawings.
6. <**Insert trim and requirements>**.

3.6 INSTALLATION OF INSULATION

A. Board Insulation: [**Adhesively**] [**Mechanically**] [**Adhesively and mechanically**] attach insulation to substrate in compliance with ASTM C1397 and the following:

1. Sheathing: Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to substrate. Apply adhesive to a thickness of not less than 1/4 inch for factory mixed and not less than 3/8 inch for field mixed, measured from surface of insulation before placement.
2. Concrete or Masonry: Apply adhesive by ribbon-and-dab method.
3. Press and slide insulation into place. Apply pressure over entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
4. Allow adhered insulation to remain undisturbed for not less than 24 hours, before [**installing mechanical fasteners,**] beginning rasping and sanding insulation or before applying base coat and reinforcing mesh.

5. Mechanically attach insulation to substrate. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
   a. Steel Framing: 5/16 inch.
   b. Wood Framing: 1 inch.
   c. Concrete and Masonry: 1 inch.
6. Apply insulation over dry substrates in courses, with long edges of boards oriented horizontally.
7. Begin first course of insulation from a level base line and work upward.
8. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
9. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints, so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings [**and not less than 4 inches from aesthetic reveals**].
   a. Adhesive Attachment: Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.
   b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
10. Interlock ends at internal and external corners.
11. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
12. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
13. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than [**1/32 inch**] [**1/16 inch**] from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.
14. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
15. Install foam buildouts and attach to structural substrate by [**adhesive**] [**mechanical fastening**] [**adhesive and mechanical fastening**].
16. Interrupt insulation for expansion joints where indicated.
17. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
18. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
19. Before installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
20. Treat exposed edges of insulation as follows:
    a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
    c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
21. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS lamina.

B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:

1. At expansion joints in substrates behind EIFS.
2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
3. At floor lines in multilevel wood-framed construction.
4. Where wall height or building shape changes.
5. Where EIFS manufacturer requires joints in long continuous elevations.
6. Where panels abut one another.

3.7 APPLICATION OF BASE COAT

A. Water-Resistant Base Coat: Apply full-thickness coverage [**to exposed insulation and**] to exposed surfaces of [**sloped shapes**] [**window sills**] [**parapets**] [**foam buildouts**] <**Insert location>** and to other surfaces indicated on Drawings.

B. Base Coat: Apply full coverage to exposed insulation [**and foam buildouts**]with not less than [**1/16-inch**] <**Insert dimension>** dry-coat thickness.

C. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C1397. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

D. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.

3.8 APPLICATION OF FINISH COAT

A. Primer: Apply over dry base coat.

B. Finish Coat: Apply full-thickness coverage over dry [**primed**]base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

1. Embed aggregate in finish coat to produce a uniform applied-aggregate finish of color and texture matching approved sample.

3.9 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. As stipulated in Ch. 17 of the IBC.
2. <**Insert special inspections>**.

B. Testing Agency: [**Owner will engage**] a qualified testing agency to perform tests and inspections.

C. EIFS Tests and Inspections: In accordance with ASTM E2568 <**Insert tests and inspections>**.

D. Prefabricated Panels: Test and inspect field welds.

E. EIFS will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.10 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 072413

SECTION 072600

VAPOR RETARDER UNDER SLABS ON GRADE

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-In-Place Concrete: Section 033000 or 033001.

B. Earthwork: Section 310000.

1.02 REFERENCES

A. ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

B. ASTM D 1709 Standard Test Methods of Impact Resistance of Plastic Film by the Free-Falling Dart Method.

C. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

D. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.

E. ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

F. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each material specified.

B. Samples:
   1. Vapor Retarder Material: 12 inches square.
   2. Pressure-Sensitive Tape: 36 inch long piece minimum.

PART 2 PRODUCTS

2.01 COMPANIES

A. Fortifiber Building Systems Group, 419 West Plumb Lane, Reno, NV 89509-3766, 800-773-4777, www.fortifiber.com.

B. Raven Industries Inc., PO Box 5107, Sioux Falls, SD 57117-5107, (605) 336-2750, www.ravenind.com.

C. Stego Industries LLC, 232 Avenida Fabricante #103, San Clemente, CA 92672-7553, (877) 464-7834, www.stegoindustries.com.

D. W. R. Meadows, Inc., PO Box 338, Hampshire, IL 60140-0338, (800) 342-5976, www.wrmeadows.com.

2.02 MATERIALS

A. Vapor Retarder: Extruded single-ply or multi-ply type; polyethylene or polyolefin.
   1. Water-Vapor Permeance (ASTM E 96 or ASTM E 154): 0.04 perms or less.
   2. Class Rating (ASTM E 1745): A.
   3. Tensile Strength (ASTM E 154 or ASTM D 882): 45 lbf./in. or higher.
   4. Puncture resistance (ASTM D 1709): 2200 g or higher.
   5. Thickness: 10 mils minimum.
   6. Acceptable Products:
      a. "Moistop Ultra 10" by Fortifiber Building Systems Group.
      b. "Vapor Block 10" by Raven Industries, Inc.
      c. "Stego Wrap 10-Mil Vapor Barrier" by Stego Industries, LLC.
      d. "Perminator 10 Mil Underslab Vapor-Mat" by W. R. Meadows, Inc..

B. Vapor Retarder: Extruded single-ply or multi-ply type; Polyethylene or polyolefin.
   1. Water-Vapor Permeance (ASTM E 96 or ASTM E 154): 0.025 perms or less.
   2. Class Rating (ASTM E 1745): A.
   3. Tensile Strength (ASTM E 154 or ASTM D 882): 70 lbf./in. or higher.
   4. Puncture resistance (ASTM D 1709): 2400 g or higher.
   5. Thickness: 15 mils minimum.
   6. Acceptable Products:
      a. "Moistop Ultra 15" by Fortifiber Building Systems Group.
      b. "Vapor Block 15" by Raven Industries, Inc.
      c. "Stego Wrap 15-Mil Vapor Barrier" by Stego Industries, LLC.
      d. "Perminator 15 Mil Underslab Vapor-Mat" by W. R. Meadows, Inc..

C. Pressure-Sensitive Tape/Adhesive: Vapor retarder manufacturer's standard or recommended materials.

D. Pipe Boots: Vapor retarder manufacturer's standard pipe boots, or construct pipe boots from vapor retarder material, pressure-sensitive tape and/or adhesive, in accordance with vapor retarder manufacturer's instructions

PART 3 EXECUTION

3.01 PREPARATION

A. Surface Preparation: Rake, trim, and tamp surfaces over which vapor retarder is to be installed to true planes and as required to make a surface that will not puncture the vapor retarder material.

3.02 INSTALLATION

A. Install vapor retarder in accordance with manufacturer's printed instructions and ASTM E 1643. Lap seams and joints a minimum of 6 inches and seal with adhesive or pressure-sensitive tape.

B. Lap vapor retarder over footings and seal to foundation walls.

C. Seal penetrations, including pipes, with pipe boots.

3.03 PROTECTION

A. Protect vapor retarder as required so that it will be in sound condition, free from punctures and tears, at the time the concrete is placed.

3.04 REPAIR

A. Repair tears and punctures with a piece of vapor retarder material, overlapping the tear or puncture a minimum of six inches on all sides, and completely seal edges with pressure-sensitive tape or adhesive.

END OF SECTION

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber-reinforced asphalt shingles.
2. Underlayment materials.
3. Ridge vents.
4. Metal flashing and trim.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for roof ventilators.

1.2 DEFINITIONS

A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Asphalt shingles.
2. Underlayment materials.
3. Asphalt roofing cement.
4. Elastomeric flashing sealant.

B. Samples: For each exposed product and for each color and blend specified, in sizes indicated.

1. Asphalt Shingles: Full size.
2. Ridge and Hip Cap Shingles: Full size.
3. Ridge Vent: 12-inch- long Sample.
4. Exposed Valley Lining: 12 inches square.

C. Samples for Initial Selection:

1. For each type of asphalt shingle indicated.
2. For each type of accessory involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's materials warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For asphalt shingles to include in maintenance manuals.

B. Materials warranties.

C. Roofing Installer's warranty.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 100 sq. ft. of each type and in each color and blend, in unbroken bundles.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.

B. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.

C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.

D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.

1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.11 WARRANTY

A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Manufacturing defects.
2. Materials Warranty Period: 35 years from date of Substantial Completion, prorated, with first five years nonprorated.
3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 110 mph for five years from date of Substantial Completion.

4. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of product from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

C. Energy Performance, ENERGY STAR: Provide asphalt shingles that are listed on the DOE's "ENERGY STAR Roof Product List" for steep-slope roof products.

2.3 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D3462/D3462M, laminated, multi-ply overlay construction; glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Butt Edge: Straight cut.
2. Strip Size: Manufacturer's standard .
3. Algae Resistance: Granules resist algae discoloration.
4. Color and Blends: As selected by Architect from manufacturer's full range .

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles .

2.4 UNDERLAYMENT MATERIALS

A. Glass-Reinforced Felt: ASTM D6757/D6757M, asphalt-saturated, glass-reinforced organic felt or inorganic fiber-based felt.

2.5 RIDGE VENTS

A. Flexible Ridge Vent: Manufacturer's standard, compression-resisting, three-dimensional, open-nylon or polyester-mat filter bonded to a nonwoven, nonwicking, geotextile fabric cover.

2.6 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.

C. Roofing Nails: ASTM F1667, aluminum, stainless steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, sharp-pointed, with a 3/8- to 7/16-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through sheathing less than 3/4 inch thick.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

D. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- minimum diameter.

2.7 METAL FLASHING AND TRIM

A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Sheet Metal: Copper Stainless steel Zinc-tin alloy coated copper .

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.

1. Drip Edges: Fabricate in lengths not exceeding 10 feet with minimum 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
2. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through asphalt shingles.
3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT MATERIALS

A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

B. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.
   a. Lap sides not less than 4 inches.
   b. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
   c. Roll laps with roller.
3. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
4. Eaves: Extend from edges of eaves 36 inches beyond interior face of exterior wall.
5. Rakes: Extend from edges of rakes 36 inches beyond interior face of exterior wall.
6. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
7. Sidewalls: Extend 18 inches beyond sidewalls and return vertically against sidewalls not less than 4 inches .
8. Roof-Slope Transitions: Extend 18 inches on each roof slope.
9. Cover underlayment within seven days.

3.3 INSTALLATION OF METAL FLASHING AND TRIM

A. Install metal flashings and trim to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Install metal flashings in accordance with recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.

B. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.

C. Eave Drip Edges: Install below underlayment materials and fasten to roof deck.

D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 INSTALLATION OF ASPHALT SHINGLES

A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install first and remaining courses of three-tab-strip asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

E. Fasten asphalt shingle strips with a minimum of five roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.

1. Locate fasteners in accordance with manufacturer's written instructions.
2. When ambient temperature during installation is below 50 deg F , hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.

F. Ridge Vents: Install continuous ridge vents over asphalt shingles in accordance with manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

G. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.

1. Fasten with roofing nails of sufficient length to penetrate sheathing.
2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name>** of <**Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:

1. Owner: <**Insert name of Owner>**.
2. Owner Address: <**Insert address>**.
3. Building Name/Type: <**Insert information>**.
4. Building Address: <**Insert address>**.
5. Area of the Work: <**Insert information>**.
6. Acceptance Date: <**Insert date>**.
7. Warranty Period: <**Insert time>**.
8. Expiration Date: <**Insert date>**.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that, during Warranty Period, Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
   a. Lightning;
   b. Peak gust wind speed exceeding <**Insert wind speed>** mph;
   c. Fire;
   d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. Faulty construction of copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. Vapor condensation on bottom of roofing; and
   g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When the work has been damaged by any of foregoing causes, Warranty is to be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty becomes null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty does not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty becomes null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
6. Owner promptly notifies Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and affords reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and does not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty does not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day>** day of <**Insert month>**, <**Insert year>**.

1. Authorized Signature: <**Insert signature>**.
2. Name: <**Insert name>**.
3. Title: <**Insert title>**.

END OF SECTION 073113

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Standing-seam metal roof panels.

B. Related Requirements:

1. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of purlins and rafters during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
9. Review procedures for repair of metal panels damaged after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data: For standing-seam metal roof panels. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups for typical roof area only, including accessories.
   a. Size: 12 feet long by 6 feet .
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 10 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Other Design Loads: UL 90 .
2. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

C. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A- 105 .
2. Hail Resistance: MH .

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces .

2.2 STANDING-SEAM METAL ROOF PANELS

A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels : Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
   a. Nominal Thickness: 0.034 inch .
   b. Exterior Finish: Three-coat fluoropolymer .
   c. Color: As selected by Architect from manufacturer's full range .
2. Clips: One-piece fixed to accommodate thermal movement.
   a. 0.064-inch- nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
   b. 0.0625-inch- thick, stainless steel sheet.
3. Panel Coverage: 16 inches .
4. Panel Height: 1.0 inch .

C. Trapezoidal-Rib, Snap-Joint, Standing-Seam Metal Roof Panels : Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
   a. Nominal Thickness: 0.034 inch .
   b. Exterior Finish: Three-coat fluoropolymer .
   c. Color: As selected by Architect from manufacturer's full range .
2. Clips: One-piece fixed to accommodate thermal movement.
   a. 0.064-inch- nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
   b. 0.0625-inch- thick, stainless steel sheet.
3. Panel Coverage: 18 inches .
4. Panel Height: 1.5 inches .

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels .

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

F. Panel Fasteners: Self-tapping screws designed to withstand design loads.

G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below , wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING-SEAM METAL ROOF PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.

4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Watertight Installation:
   a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
   b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
   c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Clipless Metal Panel Installation: Fasten metal panels to supports with screw fasteners at each lapped joint at location and spacing recommended by manufacturer.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

I. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

J. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal soffit panels.

B. Related Requirements:

1. Section 074113.13 "Formed Metal Roof Panels" for lap-seam metal roof panels.
2. Section 074213.13 "Formed Metal Wall Panels" for lap-seam metal wall panels.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data:

1. Metal soffit panels.

B. Product Data Submittals:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave , including fascia, and soffit as shown on Drawings; approximately four panels wide by full eave width, including attachments and accessories.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces .

2.2 METAL SOFFIT PANELS

A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. V-Groove-Profile Metal Soffit Panels : Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with a V-groove joint between panels.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ATAS International, Inc.
   b. McElroy Metal, Inc.
   c. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
   a. Nominal Thickness: 0.034 inch .
   b. Exterior Finish: Three-coat fluoropolymer .
   c. Color: As selected by Architect from manufacturer's full range .
3. Panel Coverage: 14 inches .
4. Panel Height: 0.44 inch .

2.3 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

2.4 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
   a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Wire tie or clip furring channels to supports , as required to comply with requirements for assemblies indicated.

3.3 INSTALLATION OF METAL SOFFIT PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
6. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074293

SECTION 075113 - BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Built-up asphalt roofing.
2. Substrate board.
3. Roof insulation.
4. Materials and application procedures for a unit and curb installation on a built-up roofing system.

B. Section includes the installation of 3 ply flashing at new curb locations. Tie into existing roofing system.

C. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashing.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

C. Warranties: Special warranties specified in this Section.

1.6 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer.

1. Protect stored liquid material from direct sunlight.
2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources.

1. Store in a dry location.
2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roofing membrane, base flashings, new curbs, new flashing and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/C3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical to that specified for this Project.

1. ASCE 7 minimum uplift resistance, calculated using a safety factor of 2:
   a. a. Field Zone: 70 psf
   b. b. Perimeter Zones: 115 psf
   c. c. Corner Zone: 175 psf

E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency.

1. Identify products with appropriate markings of applicable testing agency.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.
2. Ecology Commercial and Industrial Roofing Systems.
3. Tremco Incorporated.

B. Source Limitations: Obtain components for roofing system from manufacturer approved by roofing membrane manufacturer.

2.3 BASE FLASHING SHEET MATERIALS

A. Ply Sheet: Burmastic Composite Ply HT by Tremco Inc.

B. Cap Sheet: Powerply Standard FR by Tremco Inc.

C. Liquid Flashing System: Roof membrane manufacturer's standard one- or two-part moisture curing resin with low solvent content, consisting of a primer, flashing cement, and scrim.

2.4 ASPHALT MATERIALS

A. Asphaltic Primer: Tremprime WB by Tremco Inc.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with other roofing components.

1. Reinforcing Mesh: Burmesh by Tremco Inc.

2. Sealant: Polyroof SF by Tremco Inc

B. Cold Process Adhesive: Powerply Standard Cold by Tremco Inc.

C. Roof Vents: As recommended by roof membrane manufacturer.

1. Size: Not less than 4-inch diameter.

D. Sheathing Paper: Red-rosin type, minimum 3 lb./100 sq. ft.

E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8-inch-thick; with anchors.

F. Cold-Applied Asphalt Adhesive: ASTM D3019, Type III, roof system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with roofing system and base flashings.

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening built-up roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.

H. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.6 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by roof membrane manufacturer, approved for use in FM Approvals' RoofNav-listed roof assemblies, approved for use in SPRI's Directory of Roof Assemblies listed roof assemblies.

B. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, 1.6-lb/cu. ft. minimum density, 25psi minimum compressive strength, square edged.

1. Thermal Resistance: R-value of 5.0 per inch.
2. Size39
3. Thickness:
   a. Curb insulation: 1 1/2 inches.

2.7 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive.
2. Bead-applied, low-rise, one-component, or multicomponent urethane adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
5. Verify that minimum concrete drying period recommended by roofing manufacturer has passed.
6. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
   a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three test probes.
   b. Submit test reports within 24 hours of performing tests.
7. Verify that concrete-curing compounds that impair adhesion of roofing components to roof deck have been removed.
8. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.
9. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
10. Verify that any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
11. Verify that adjacent cementitious wood fiber panels are vertically aligned to within 1/8-inch at top surface.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions.

1. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

1. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft., and allow primer to dry.

D. Perform fastener-pullout tests according to roof system manufacturer's recommendations.

1. Submit test result within 24 hours of performing tests.
   a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

E. Install sound-absorbing insulation strips in ribs of acoustical roof decks according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.

1. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

D. Asphalt Heating:

1. Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application.
2. Circulate asphalt during heating.
   a. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application.
3. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating.
4. Do not heat asphalt within 25 deg F of flash point.
5. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
   a. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.

E. Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing manufacturer's written instructions.

F. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing components or adjacent building construction.

3.4 INSTALLATION OF SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.

1. At steel roof decks, install substrate board at right angle to flutes of deck.
   a. Locate end joints over crests of steel roof deck.
2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.
5. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturer's written instructions.
6. Loosely lay substrate board over roof deck.

B. Using a spud bar remove stone gravel from work areas.

C. Clean and prime existing gravel built up roof with Tremprime WB at 200-400 square feet per gallon and allow to tack.

D. Apply Tremco Powerply Standard Cold adhesive at two gallons per square per ply to existing roof and new units and apply two plies of Burmastic Composite Ply HT into cold adhesive. Broom plies in for clean tight finish.

E. Apply Tremco Powerply Standard Cold adhesive at two gallons per square over newly installed two ply and apply Tremco Powerply Standard FR. Broom in for clean finish.

F. Terminate top of new sheet with termination bar every 6 O.C. and ensure termination bar is counter flashed with slip metal.

G. Run leading edge of new two ply Burmastic Composite Ply HT base plies as well as Powerply Standard FR cap sheet onto existing roof per drawings. Seal leading edge of new flashing system into existing roof in three course fashion using Polyroof SF and Burmesh.

H. Seal veritical laps and corners in three course fashion using Polyroof SF and Burmsh.

I. Push back stone gravel.

J. Pipe and conduit to receive new copper pitch pockets installed to scope above and filled with Tremco pourable sealer once complete.

K. Any large repairs required to roof during removal of old units will be as follows. Scratch stone and prime roof. Install Powerply cold adhesive at 2 gallon per square and embed Composite Ply HT to complete 4 ply system. Seal leading edges of patch in three course per above scope with Polyroof and Burmesh. Flood patch with cold asphalt and embed stone.

3.5 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install one lapped base sheet course and mechanically fasten to substrate according to roofing membrane manufacturer's written instructions.

D. Nailer Strips: Mechanically fasten 4-inch nominal-, width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:

1. 16 feet apart for roof slopes greater than 1 inch per 12 inches but less than 3 inches per 12 inches.

E. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane with vertical surfaces or angle changes greater than 45 deg.

3.6 INSTALLATION OF FLASHING AND STRIPPING

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches above built-up roofing and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

1. Seal top termination of base flashing.

D. Install liquid flashing system according to manufacturer's recommendations.

1. Extend liquid flashing not less than 3 inches in all directions from edges of item being flashed.
2. Embed granules, matching color of roof membrane, into wet compound.

E. Install stripping according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on roofing membrane.

1. Flashing Sheet Stripping: Install flashing sheet stripping in a continuous coating of asphalt roofing cement, in a solid mopping of hot roofing asphalt applied at not less than 425 deg F, and extend onto roofing membrane, in cold-applied adhesive, or in cold-applied polymer-modified adhesive.

3.7 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing components that do not comply with requirements, repair substrates, and repair or reinstall roofing to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075113

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Reglets and counterflashings.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 074113.16 "Standing-Seam Metal Roof Panels" for roof-edge drainage-system components provided by metal-roof-panel manufacturer.
3. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Section 077253 "Snow Guards" for manufactured snow guard devices.
5. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site .

1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Copings.
2. Reglets and counterflashings.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

1.6 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge as indicated on Drawings.
2. Build mockup of typical roof edge as part of Integrated Exterior Mockup specified in Section 014000 "Quality Requirements"
3. Build mockup of typical roof edge, including fascia , approximately 10 feet long, including supporting construction, seams, attachments, underlayment, and accessories.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 074113.16 &075113 " Standing Seam Metal Roofing & Built-up Asphalt Roofing ."

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 074113.16 Standing Seam Metal Roof Panels & 075113 Built up Asphalt Roofing. .

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals' Listing: Manufacture and install copings roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-105 . Identify materials with FM Approvals' markings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces.

2.3 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet , concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal thickness as required to meet performance requirements .
   a. Surface: Smooth, flat finish.
   b. Finish: Three-coat fluoropolymer .
   c. Color: As selected by Architect from manufacturer's full range .
2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, thickness as required to meet performance requirements .
   a. Surface: Smooth, flat finish.
   b. Finish: Three-coat fluoropolymer .
3. Corners: Factory mitered and continuously welded .
4. Special Fabrications: Two-way sloped coping cap .
5. Coping-Cap Attachment Method: Snap-on or face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.
   a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
   b. Face-Leg Cleats: Concealed, continuous galvanized-steel sheet .

2.4 REGLETS AND COUNTERFLASHINGS

A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Formed Aluminum: 0.050 inch thick.
2. Stainless Steel: 0.0250 inch thick.
3. Corners: Factory mitered and continuously welded .

4. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

B. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

C. Aluminum Finish: Mill .

D. Stainless Steel Finish: ASTM A480/A480M No. 2B (bright, cold rolled, unpolished) .

2.5 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

C. Aluminum Extrusions: ASTM B221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

2.6 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F.

B. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

2.7 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel in accordance with ASTM A153/A153M or ASTM F2329.

B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Galvanized-Steel Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.
   a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Apply continuously under copings and reglets and counterflashings.
2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. Install roof specialties in accordance with manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum and stainless steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance .

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 INSTALLATION OF COPINGS

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at [**40-inch centers**] manufacturer's required spacing that meets performance requirements .

3.5 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

A. Coordinate installation of reglets and counterflashings with installation of base flashings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Roof hatches.
4. Pipe and duct supports.
5. Pipe portals.
6. Preformed flashing sleeves.
7. Roof walkways.

B. Related Requirements:

1. Section 055213 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
2. Section 076100 "Sheet Metal Roofing" for shop- and field-formed roof curbs and snow guards for sheet metal roofing.
3. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.
4. Section 077253 "Snow Guards" for snow guards.
5. Section 237413 "Packaged, Outdoor, Central-Station Air-Handling Units" for standard curbs specified with rooftop units.
6. Section 284621.11 "Addressable Fire-Alarm Systems" for interconnects to automatically operated heat and smoke vents.

1.2 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported .

D. Steel: Zinc-coated (galvanized) Aluminum-zinc alloy-coated steel sheet, 0.064 inch thick.

1. Finish: Two-coat fluoropolymer Baked enamel or powder coat .
2. Color: As selected by Architect from manufacturer's full range .

E. Construction:

1. Curb Profile: Profile as indicated on Drawings compatible with roofing system.
2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
3. Fabricate curbs to minimum height of as indicated on drawings above roofing surface unless otherwise indicated.
4. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
5. Liner: Same material as curb, of manufacturer's standard thickness and finish.
6. Nailer: Factory-installed wood nailer under top flange on side of curb, continuous around curb perimeter.

7. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
8. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced perimeter metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed structure-mounting flange at bottom.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported .

D. Steel: Zinc-coated (galvanized) steel sheet, 0.064 inch thick.

1. Finish: Mill phosphatized .
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color>**.

E. Aluminum: [**0.090 inch**] [**0.125 inch**] <**Insert dimension>** thick sheet.

1. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish>**.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color>**.

F. Stainless Steel: [**0.0781 inch**] <**Insert dimension>** thick sheet.

1. Finish: [**Manufacturer's standard**] [**ASTM A480/A480M, No. 2D, directional polish finish**] <**Insert finish>**.

G. Construction:

1. Curb Profile: [**Manufacturer's standard**] [**Profile as indicated on Drawings**] compatible with roofing system.
2. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
4. Nailer: Factory-installed continuous wood nailers 5-1/2 inches wide under top flange on side of curb, continuous around support perimeter.
5. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
6. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
7. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
8. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
9. Fabricate equipment supports to minimum height of 12 inches above roofing surface unless otherwise indicated.
10. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.4 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated single -walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

B. Type and Size:

1. Single-leaf lid, 36 by 36 inches .

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material, Steel: Aluminum-zinc alloy-coated steel sheet.

1. Thickness: 0.079 inch .
2. Finish: Two-coat fluoropolymer Baked enamel or powder coat .
3. Color: As selected by Architect from manufacturer's full range .

E. Construction:

1. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
2. Hatch Lid: , insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. Fabricate curbs to minimum height of as noted on drawings above roofing surface unless otherwise indicated.

F. Hardware: Spring operators, hold-open arm, galvanized steel spring latch with turn handles, galvanized steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: 42 inches above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.
4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
9. Fabricate joints exposed to weather to be watertight.
10. Fasteners: Manufacturer's standard, finished to match railing system.
11. Finish: Manufacturer's standard .
    a. Color: As selected by Architect from manufacturer's full range .

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: 42 inches above finished roof deck.
3. Material: Aluminum.
4. Post: 1-5/8-inch- diameter pipe.
5. Finish: Manufacturer's standard baked enamel or powder coat .
    a. Color: As selected by Architect from manufacturer's full range .

2.5 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high, with removable metal hood and slotted metal collar.

1. Metal: Aluminum sheet, 0.063 inch thick.
2. Diameter: As indicated on Drawings .
3. Finish: Manufacturer's standard .

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Metal: Aluminum sheet, 0.063 inch thick .
2. Height: 13 inches .
3. Diameter: As indicated on Drawings .
4. Finish: Manufacturer's standard .

2.6 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation and mill phosphatized for field painting where indicated.

1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 coated.

1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

C. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.

D. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

E. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.

F. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

G. Steel Tube: ASTM A500/A500M, round tube.

H. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

I. Steel Pipe: ASTM A53/A53M, galvanized.

2.7 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness as indicated.

C. Glass-Fiber Board Insulation: ASTM C726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

D. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G. Underlayment:

1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D4397.
3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

H. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

I. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

J. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

K. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

L. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer's written instructions.

E. Heat and Smoke Vent Installation:

1. Install heat and smoke vent so top perimeter surfaces are level.
2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.

F. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

G. Preformed Flashing-Sleeve and Flashing-Pipe Portal Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.

H. Roof Walkway Installation:

1. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
2. Remove ballast from top surface of low-slope roofing at locations of contact with roof-walkway supports.
3. Install roof walkway support pads prior to placement of roof walkway support stands onto low-slope roofing.
4. Redistribute removed ballast after installation of support pads.

I. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077253 - SNOW GUARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rail-type, flat-mounted metal snow guards for exposed fastened metal roofs.
2. Rail-type, seam-mounted metal snow guards for standing-seam metal roofs.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location>**.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.

1. Include details of assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

C. Samples: Include bracket, 12-inch- long rail, and installation hardware.

D. Delegated Design Submittals: For snow guards, include analysis reports signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include calculation of number and location of snow guards.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer [**and delegated design engineer**].

B. Evaluation Reports: For each type of snow guard, from ICC-ES, for tests performed by a [**recognized ISO 17025-accredited independent**] testing agency, indicating load-to-failure of attachment to roof system identical to roof system used on this Project.

C. Sample warranties.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers: Current certificate holder for compliance with ISO 9001:2015. [**Manufactured in an ISO 9001:2015-certified and ICC-audited facility.**]
2. Delegated Design Engineer: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.

1.6 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups as indicated on Drawings.
2. Build mockups for each form and finish of railing, consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches in length.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components to Project site properly packaged to provide protection during transport, delivery, and handling.

B. Store products in manufacturer's original labeled and unopened packaging in a clean and dry location, protected from potential damage, until ready for application.

1.8 WARRANTY

A. Special Warranty: Manufacturer warrants that all products manufactured by it and bearing its name are free from defects in material and workmanship on the date of first sale and for the life of the roof. The sole and exclusive remedy for breach of this warranty is repair or replacement of manufactured products that are determined to be defective.

1. Warranty is conditional upon the return of products claimed to be defective.
2. Warranty Period: Limited Lifetime from date of first sale.

B. Snow Retention System Warranty: Manufacturer warrants that snow guard system will not pull off the seam, break, or otherwise yield, causing the system to release; that snow guard system cross members and its anchorage will not buckle, break, or otherwise yield or separate from the clamps; that snow guard system will not prematurely or excessively corrode and will not cause premature and excessive corrosion of the roof system; and that snow guard system will not cause structural damage to the roof panels.

1. In the event of system failure, manufacturer will provide comparable manufacturer-branded replacement parts and labor necessary to repair the snow retention system or component part. Replacement parts will be warranted for the remainder of the original warranty period.
2. Manufacturer will make final determination as to the existence or cause of any alleged system failure and whether the roof is no longer commercially serviceable.
3. Warranty Period: Limited Lifetime from date of delivery.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Provide components and materials specified in this Section from single manufacturer for a complete and compatible assembly.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design snow guards, including attachment to roofing material and roof deck, as applicable for attachment method, based on the following:

1. Roof snow load.
2. Snow drifting.
3. Roof slope.
4. Roof type.
5. Roof dimensions.
6. Roofing substrate type and thickness.
7. Snow guard type.
8. Snow guard fastening method and strength.
9. Snow guard spacing.
10. Coefficient of Friction between Snow and Roof Surface: Zero.
11. Factor of Safety: [**2**] [**3**] <**Insert factor of safety>**.

B. Provide snow guards that withstand exposure to weather and accommodate thermally induced movement without failure, rattling, or fastener disengagement.

1. Temperature Change: [**200 deg F , ambient and material surfaces**] <**Insert temperature change>**.

C. Snow guards to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Snow Loads: [**As indicated on Drawings**] <**Insert loading requirements>**.

2.3 RAIL-TYPE SNOW GUARDS

A. Rail-Type, Flat-Mounted Metal Snow Guards for Exposed Fastened Metal Roofs:

1. Basis-of-Design Product: Subject to compliance with requirements, provide S-5! Metal Roof Innovations, Ltd.; VersaGard Snow Retention System or comparable product by one of the following:
   a. Levi's Building Components.
   b. LMCurbs.
   c. Red Dot Products.
   d. Rocky Mountain Snow Guards, Inc.
   e. Sky Products.
   f. <**Insert manufacturer's name>**.
2. Description: Units fabricated from metal baseplate anchored to fixed bracket and equipped with [**one**] [**two**] [**bar(s)**] [**rail(s)**] [**pipe(s)**].
3. Brackets, Baseplates, and Bars: ASTM B221, 6061-T6 aluminum; mill finish.
   a. Profile: Round with integral track to accept color-matching inserts of material and finish used for metal roof.
4. Fasteners: Manufacturer's standard; of size, type, grade, and class required for application, suitable for secure attachment into substrate, acceptable to authorities having jurisdiction, and that comply with requirements specified for material and manufacture.
5. Accessories: Manufacturer's standard; include splice connectors, collars, end caps, and associated mounting accessories matching rail finishes and meeting performance requirements.

B. Rail-Type, Seam-Mounted Metal Snow Guards for Standing-Seam Metal Roofs:

1. Basis-of-Design Product: Subject to compliance with requirements, provide S-5! Metal Roof Innovations, Ltd.; [**ColorGard**] [**X-Gard 1.0**] [**X-Gard 2.0**] [**SnoRail**] [**SnoFence**] [**DualGard**] Snow Retention System or comparable product by one of the following:
   a. Levi's Building Components.
   b. LMCurbs.
   c. Red Dot Products.
   d. Rocky Mountain Snow Guards, Inc.
   e. Sky Products.
   f. <**Insert manufacturer's name>**.
2. Description: Snow guard rails fabricated from metal [**pipes**] [**bars**] [**extrusions**], anchored to brackets and equipped with [**one rail**] [**two rails**] [**one rail with integral track to accept color-matching inserts of material and finish used for metal roof**].
3. Brackets and Bars: ASTM B221, 6000 series alloy and temper aluminum; mill finish.

a. Profile: [**Round**] [**Square**] [**with integral track to accept color-matching inserts of material and finish used for metal roof**].

4. Seam Clamps: Red brass, copper UNS C23000 alloy with 300 series stainless steel, 18-8 alloy setscrews incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.
5. Seam Clamps: ASTM B221, 6061-T6 aluminum extrusion or ASTM B85/B85M aluminum casting with 300 series stainless steel, 18-8 alloy setscrews incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.
6. Accessories: Manufacturer's standard; include splice connectors, collars, end caps, and associated mounting accessories matching rail finishes and meeting performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare substrates for installation of snow guards in accordance with snow guard manufacturer's written instructions.

3.3 INSTALLATION

A. Install snow guards in accordance with manufacturer's written instructions.

1. Space rows as indicated on [**Drawings**] [**Shop Drawings**].
2. Space rows as recommended in writing by manufacturer.

B. Attachment for Exposed Fastened Metal Roofing:

1. Do not use fasteners that will void metal roofing finish warranty.
2. Rail-Type, Flat-Mounted Snow Guards:
   a. Install brackets in straight rows.
   b. Mechanically fasten to metal roofing, using mechanical fasteners identical to those used to secure metal roofing to substrate.
   c. Install cross members to brackets.

C. Attachment for Standing-Seam Metal Roofing:

1. Do not use fasteners that will penetrate metal roofing or fastening methods that void metal roofing finish warranty.
2. Rail-Type, Seam-Mounted Snow Guards:
   a. Install brackets to vertical ribs in straight rows.
   b. Secure with stainless steel setscrews, incorporating round nonpenetrating point, on same side of standing seam.
   c. Torque setscrew in accordance with manufacturer's written instructions.
   d. Install cross members to brackets.

END OF SECTION 077253

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated construction.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data:

1. Joints in or between fire-resistance-rated construction.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with Listed System Designs published by a qualified testing agency.
        1) UL in its online directory "Product iQ."

B. Rain/Water Resistance: For perimeter fire-barrier system applications, where inclement weather or greater-than-transient water exposure is expected, use products that dry rapidly and cure in the presence of atmospheric moisture sufficient to pass ASTM D6904 early rain-resistance test (24-hour exposure).

2.3 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
3. Provide firestop products that do not contain ethylene glycol.

B. Intumescent Gypsum Wall Framing Gaskets (Applied to Steel Tracks, Runners, and Studs prior to Framing Installation): Provide products with fire, smoke, and acoustical ratings that allow movement up to 100 percent

compression and/or extension in accordance with UL 2079 or ASTM E1966; have an L Rating less than 1 cfm/ft. in accordance with UL 2079; and a minimum Sound Transmission Class (STC) rating of 56 in accordance with ASTM E90 or ASTM C919.

C. For aluminum curtain-wall assemblies with one- or two-piece rectangular mullions at least 2-1/2 by 5 inches, provide perimeter fire-barrier system that does not require direct screw attachment to mullions and transoms to support and fasten curtain-wall insulation. System to be tested in accordance with ASTM E2307 for up to 2-hour fire resistance and with ASTM E1233 for wind cycling equivalent to 108 mph wind for 500 cycles.

D. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Services.
   b. Hilti, Inc.
   c. Owens Corning.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

E. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Services.
   b. Hilti, Inc.
   c. Owens Corning.
2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

F. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Services.
   b. Hilti, Inc.
   c. Owens Corning.
2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

G. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

2.4 ACCESSORIES

A. Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition occurs, such as the intersection of a gypsum wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

3.3 INSTALLATION

A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft..

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.

6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections in accordance with ASTM E2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's online directory "Product iQ" under product Category XHBN or Category XHDG.

B. Floor-to-Floor, Joint Firestopping Systems: .

1. Assembly Rating: 1 hour 2 hours .
2. Nominal Joint Width: As indicated .
3. Movement Capabilities: Class II - percent compression or extension .
4. W-Rating: No leakage of water at completion of water leakage testing.

C. Wall-to-Wall, Joint Firestopping Systems: .

1. UL-Classified Systems: WW- D - .
2. Assembly Rating: 1 hour 2 hours .
3. Nominal Joint Width: As indicated .
4. Movement Capabilities: Class II - percent compression or extension.

D. Floor-to-Wall, Joint Firestopping Systems: .

1. UL-Classified Systems: FW- D - .
2. Assembly Rating: 1 hour 2 hours .
3. Nominal Joint Width: As indicated .
4. Movement Capabilities: Class II - percent compression or extension .

E. Head-of-Wall, Fire-Resistive Joint Firestopping Systems: .

1. UL-Classified Systems: HW- D - .
2. Assembly Rating: 1 hour 2 hours .
3. Nominal Joint Width: As indicated .
4. Movement Capabilities: Class II - percent compression or extension.

F. Perimeter Joint Firestopping Systems: .

1. UL-Classified Perimeter Fire-Containment Systems: CW- D - .
2. Integrity Rating: 1 hour 2 hours .
3. Movement Capabilities: Class II - percent compression or extension.
4. F-Rating: 1 hour 2 hours .

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Polysulfide joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Polysulfide joint sealants.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports: For field-adhesion-test reports, for each sealant application tested.

B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

1.6 QUALITY ASSURANCE

1.7 MOCKUPS

A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.8 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.

B. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.

2.4 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.

B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

2.6 POLYSULFIDE JOINT SEALANTS

A. Polysulfide, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, polysulfide joint sealant; ASTM C920, Type M, Grade NS, Class 25, Use NT.

B. Polysulfide, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, polysulfide joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T and NT.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    a. Concrete.
    b. Masonry.
    c. .
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    a. Metal.
    b. Glass.
    c. .

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
4. Provide flush joint profile at locations indicated on Drawings in accordance with Figure 8B in ASTM C1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings in accordance with Figure 8C in ASTM C1193.
    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
    a. Extent of Testing: Test completed and cured sealant joints as follows:
        1) Perform 10 tests for the first 1000 ft. of joint length for each kind of sealant and joint substrate.
        2) Perform one test for each 1000 ft. of joint length thereafter or one test per each floor per elevation.
    b. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.
        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
    c. Inspect tested joints and report on the following:
        1) Whether sealants filled joint cavities and are free of voids.
        2) Whether sealant dimensions and configurations comply with specified requirements.
        3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
    d. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.

e. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

C. Prepare test and inspection reports.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standard steel doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.5 ACTION SUBMITTALS

A. Product Data:

1. Interior standard steel doors and frames.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.

7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

D. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.

E. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.8 QUALITY ASSURANCE

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; AADG, Inc.; ASSA ABLOY.
2. Curries, AADG, Inc.; ASSA ABLOY Group.
3. Metropolitan Door Industries Corp.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. .

1. Doors:
   a. Type: As indicated in the Door and Frame Schedule on Drawings.
   b. Thickness: 1-3/4 inches.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
   d. Edge Construction: Model 1, Full Flush .
   e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
   f. Core: Polyurethane .
   g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener core for fire-rated doors.
2. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
   b. Construction: Full profile welded.
3. Exposed Finish: Prime .

2.4 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.7 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 .

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
   a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
   b. Install frames with removable stops located on secure side of opening.
2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8 .
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
3. Smoke-Control Doors: Install doors in accordance with NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint in accordance with manufacturer's written instructions.

C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish in accordance with manufacturer's written instructions.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081613 – FIBERGLASS REINFORCED POLYESTER (FRP) DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fiberglass reinforced polyester doors.

B. Related Sections:

1. Division 08 Section "Glazing" for glass view panels in doors.
2. Division 08 Section “Hollow Metal Doors and Frames” for hollow metal frames.
3. Division 08 Sections "Door Hardware" and "Access Control Hardware" for door hardware.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
2. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
3. ASTM D 256 - Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
4. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents.
5. ASTM D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
6. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.
7. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
8. ASTM E 84 - Surface Burning Characteristics of Building Materials.
9. NFRC 102 – Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
10. NFRC 400 - Procedure for Determining Fenestration Product Air Leakage.
11. UL 10C - Positive Pressure Fire Tests of Door Assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, components, hardware reinforcements, profiles, and finishes.

B. Templates: Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors.
3. Locations of reinforcement and preparations for hardware.
4. Details of each different wall opening condition.
5. Details of accessories.
6. Details of preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain doors and frames through one source from a single manufacturer wherever possible.
1. Smoke Control Door Assemblies: Comply with NFPA 105.

a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

B. Pre-Installation Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

B. Store materials under cover at Project site in accordance with the manufacturer’s instructions. Do not store in a manner that traps excess humidity

C. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation. Stack doors and frames in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for door frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

A. Provide manufacturer's written warranty against defects in materials and workmanship upon final completion and acceptance of Work in this section. Warranty period is ten years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CECO Door Products (C).
2. Curries Company (CU).
3. Special-Lite (SP).

B. Substitutions: Material from alternate door and frame fabricators will not be accepted on jobsite without prior written and sample approval in accordance with requirements specified in Division 01.

2.2 MATERIALS

A. Aluminum: 6063-T6 hardened aluminum alloy. 0.7 mil anodized finish.

B. Fiberglass Reinforced Plastic Sheet: Thickness of .120” with the finish color for the full thickness of the sheet.

C. Glazing: Comply with requirements in Division 08 Section, "Glazing."

2.3 FIBERGLASS REINFORCED POLYESTER DOORS

A. General: Provide 1-3/4 inch doors of type and design indicated, not less than thickness indicated; fabricated without visible joints or seams on exposed faces unless otherwise indicated.

1. Design: As indicated on the drawings.
2. Core Construction: Five pound density foam-in-place polyurethane core with a minimum U factor of 0.37.
3. Stiles and Rails: Extruded aluminum with mitered corners. Provide 3/8” diameter tie rods top and bottom.
4. Faces: Fiberglass reinforced plastic sheets of .120” thickness with a pebble texture.
5. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6.

2.4 FABRICATION

A. General: Fabricate work to be rigid and free of defects. Accurately form to required sizes and profiles.

B. Fiberglass Reinforced Polyester Doors:

1. Glazed Lites: Factory cut openings in doors with applied flush aluminum trim kit to fit.
2. Top Caps: Close tops of doors flush with aluminum top caps.

C. Surface Hardware Preparation: Factory prepare work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section, "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors to receive non-template, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of work for hardware.

2.5 FINISHES

A. Pebble texture face finish shall be:

1. To be selected.

B. Aluminum finish for stiles and rails, light kits shall be:

1. Satin Clear.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prior to installation, check openings for squareness, alignment, twist, and plumbness.

B. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions. Comply with NFPA 80 at fire rated openings.

B. Fiberglass Reinforced Polyester Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
c. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with door manufacturer's written instructions. Comply with NFPA requirements for fire rated glazing.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including stainless steel work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from stainless steel work immediately after installation.

C. Remove stains and materials that will have and adverse affect on the doors and frames and restore slight blemishes in accordance with manufacturer’s instructions to match original finish.

END OF SECTION 081613

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Counter door assemblies.

B. Related Requirements:

1. Section 099123 "Interior Painting" for finish painting of factory-primed doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Show locations of controls, locking devices, and other accessories.
5. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Bottom bar with sensor edge.

1.3 INFORMATIONAL SUBMITTALS

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For coiling counter doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.

1. Obtain operators and controls from coiling counter door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Sound-Control Doors: Assemblies tested in a laboratory for sound-transmission-loss performance according to ASTM E90, calculated according to ASTM E413, and rated for not less than the STC value indicated.

2.3 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ACME Rolling Doors.
   b. Amarr; an ASSA ABLOY Group company.
   c. Overhead Door Corporation.

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000 . One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Curtain R-Value: 4.5 deg F x h x sq. ft./Btu .

D. Door Curtain Material: Stainless steel .

E. Door Curtain Slats: Flat profile slats of 1-1/4-inch center-to-center height.

1. Insulated-Slat Interior Facing: Metal .
2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.

F. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated stainless steel and finished to match door .

G. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

H. Integral Frame, Hood, and Fascia: Stainless steel.

1. Mounting: Face of wall .

I. Sill Configuration: Integral metal sill.

J. Locking Devices: Equip door with locking device assembly .

1. Locking Device Assembly: Cremone-type, both jamb sides locking bars, operable from inside and outside with cylinders .

K. Manual Door Operator: Chain-hoist operator .

L. Electric Door Operator:

1. Usage Classification: Medium duty, up to 12 cycles per hour and up to 50 cycles per day .
2. Operator Location: Top of hood .
3. Motor Exposure: Interior .
4. Motor Electrical Characteristics:
   a. Horsepower: 1 hp.
   b. Voltage:
      1) 115-V ac , single phase, 60 Hz.
5. Emergency Manual Operation: Chain type.
6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar <**Insert type>**.
7. Control Station(s): Interior-side mounted .

M. Curtain Accessories: Equip door with weatherseals push/pull handles pull-down strap .

N. Door Finish:

1. Stainless Steel Finish: ASTM A480/A480M No. 4 (polished directional satin) .
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face .

2.4 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 DOOR CURTAIN MATERIALS AND FABRICATION

A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Stainless Steel Door Curtain Slats: ASTM A240/A240M or ASTM A666, Type 304; sheet thickness of 0.025 inch; and as required.
2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
3. Plastic Interior Curtain-Slat Facing: Extruded PVC plastic with maximum flame-spread index of 25 and smoke-developed index of 450, according to ASTM E84 or UL 723.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.6 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends

for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Stainless Steel: 0.025-inch- thick, stainless steel sheet, Type 304, complying with ASTM A240/A240M or ASTM A666.

B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s):

1. Stainless Steel: Type 304, complying with ASTM A240/A240M or ASTM A666.

C. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling unless otherwise indicated.

2.7 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.8 CURTAIN ACCESSORIES

A. Weatherseals: Equip door with weather-stripping gaskets fitted to entire perimeter of door for air-resistant installation unless otherwise indicated.

1. At door head, use 1/8-inch- thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene .

B. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

C. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

D. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.

2.9 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.

C. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

D. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.10 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf .

2.11 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: ASTM A480/A480M No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated for each door.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and to furnish reports to Architect.

B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.5 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide tight fit around entire perimeter.

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service is to include six months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies are to be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum sectional doors.
2. Electric operators.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
2. For power-operated doors, include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard size.

D. Samples for Initial Selection: For units with factory-applied finishes.

1. Include Samples of accessories involving color selection.

E. Samples for Verification: For each type of exposed finish and for each color and texture required on the following components, in manufacturer's standard sizes:

1. Glazing.
2. Metal for door sections.
3. Section sample.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For manufacturer's warranty and finish warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

B. Manufacturer's warranty.

C. Finish warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Regulatory Requirements: Comply with provisions in the 41 CFR, Appendix A to Subpart 101-19.6, "Uniform Federal Accessibility Standards" ICC A117.1 applicable to sectional doors.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Failure of components or operators before reaching required number of operation cycles.
   c. Faulty operation of hardware.
   d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
   e. Delamination of exterior or interior facing materials.
2. Warranty Period: Five years from date of Substantial Completion.

B. Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction.

B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Testing: In accordance with ASTM E330/E330M or DASMA 108 for garage doors and complying with DASMA 108 acceptance criteria .

2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
   a. Deflection of door sections in horizontal position (open) must not exceed 1/120 of door width.
3. Operability under Wind Load: Design sectional doors to remain operable under design uniform pressure (velocity pressure) of 30 lbf/sq. ft. wind load, acting inward and outward.

C. Windborne-Debris Impact Resistance: Provide sectional doors complying with the following requirements:

1. Garage-Door Glazed Openings: Pass DASMA 115.

D. Seismic Performance: Provide sectional doors that withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7 .

1. Component Importance Factor: 1.5 .

2.3 SECTIONAL-DOOR ASSEMBLY

A. Aluminum Sectional Door: Provide sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Raynor Garage Doors; Model AlumaView AV300 or comparable product by one of the following:
   a. C.H.I. Overhead Doors, Inc.
   b. Clopay Building Products.
   c. Raynor Garage Doors. .

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000 operation cycles. One operation cycle is complete when door is opened from closed position to the open position and returned to closed position.

C. Air Infiltration: Maximum rate of values indicated on the drawings at 15 and 25 mph when tested in accordance with ASTM E283 or DASMA 105.

D. R-Value: Value indicated on the drawings .

E. Aluminum Sections: ASTM B221 extruded-aluminum stile and rail members of alloy and temper standard with manufacturer for type of use and finish indicated; in minimum thickness required to comply with requirements ; with rail and stile dimensions and profiles indicated on Drawings; and with overlapped or interlocked weather- and pinch-resistant seal at meeting rails.

1. Door-Section Thickness: 3 inches .
2. Section Reinforcing: Continuous horizontal and diagonal reinforcement as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.
   a. Hardware Locations: Provide reinforcement for hardware attachment.
3. Insulated Stiles and Rails: Fill stiles and rails manufacturer's standard extruded polystyrene insulation.
4. Glazed Panels: Manufacturer's standard, aluminum-framed section with glazing sealed with glazing tape and retainer. Glazing as follows:
   a. 1-inch- thick insulating glass units; manufacturers' standard unit with tempered glass lites complying with ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (clear), Quality-Q3.

F. Track: Manufacturer's standard, galvanized-steel, incline track system. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides.

1. Material: Galvanized steel, ASTM A653/A653M, minimum G40 zinc coating.
2. Size: As recommended in writing by manufacturer for door size, weight, track configuration and door clearances indicated on Drawings .

3. Track Reinforcement and Supports: Provide galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches apart for door-drop safety device.
   a. Vertical Track: Incline vertical track to ensure weathertight closure at jambs. Provide continuous angle attached to track and wall.
   b. Horizontal Track: Provide continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.

G. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom top and jambs of door. Provide combination bottom weatherseal and sensor edge for bottom seal.

H. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.

1. Hinges: Heavy-duty, galvanized-steel hinges of not less than 14 gauge, 0.070-inch nominal coated thickness at each end stile and at each intermediate stile, in accordance with manufacturer's written recommendations for door size.
   a. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.
   b. Provide double-end hinges where required by door width or weight as specified by door manufacturer.
2. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Match roller-tire diameter to track width.
   a. Roller-Tire Material: Case-hardened steel .
3. Push/Pull Handles: Equip each door with galvanized-steel lifting handles on each side of door, finished to match door.

I. Locking Device:

1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
2. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
   a. Lock Cylinders: Cylinders complying with Section 087100 "Door Hardware" requirements .
   b. Keying: Keyed to building keying system .
   c. Keys: 20 for each cylinder.
3. Chain Lock Keeper: Suitable for padlock.
4. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

J. Counterbalance Mechanism:

1. Torsion Spring: Adjustable-tension torsion springs complying with requirements of DASMA 102 for number of operation cycles indicated (10,000 cycles standard), mounted on torsion shaft.
2. Cable Drums and Shaft for Doors: Cast-aluminum cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised.
   a. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide additional midpoint brackets for counterbalance shafts as required by door manufacturer.
3. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 7 to 1 .
4. Cable Safety Device: Include a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if lifting cable breaks.
5. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
6. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.

K. Electric Door Operator: Electric door operator assembly of size and capacity recommended by door manufacturer for door and operation cycles specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24 V ac or dc.
3. Safety: Listed in accordance with UL 325 by a qualified testing agency for commercial or industrial use ; moving parts of operator enclosed or guarded if exposed and mounted at 8 ft. or lower .
4. Usage Classification: Medium duty, up to 14 cycles per hour and up to 50 cycles per day .
5. Operator Type: Manufacturer's standard for door requirements .
6. Motor: Reversible-type with controller (disconnect switch) for interior, clean, and dry motor exposure. Use adjustable motor-mounting bases for belt-driven operators.
    a. Motor Size: As required to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 inches/sec. and not more than 12 inches/sec. , without exceeding nameplate ratings or service factor .
    b. Electrical Characteristics:
        1) Phase: Single phase .
        2) Volts: 115 V.
7. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
8. Obstruction Detection: Automatic external entrapment protection consisting of automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
    a. Monitored Entrapment Protection: Electric sensor edge on bottom section designed to interface with door-operator control circuit to detect damage to or disconnection of sensor and complying with requirements in UL 325.
9. Control Station: Surface mounted, three-position (open, close, and stop) control.
    a. Operation: Key .
    b. Interior-Mounted Unit: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
    c. Exterior-Mounted Unit: Full-guarded, surface-mounted, standard-duty, weatherproof type, NEMA ICS 6, Type 4 enclosure.
    d. Features: Provide the following:
        1) Vehicle detection operation.
        2) Radio-control operation.
        3) Card-reader control.
        4) Photocell operation.
        5) Door-timer operation.
        6) Explosion- and dust-ignition-proof control wiring.
        7) Audible and visual signals that comply with regulatory requirements for accessibility.
10. Emergency Manual Operation: Push-up type designed so required force for door operation does not exceed 25 lbf .
11. Emergency Operation Disconnect Device: Hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
12. Motor Removal: Design operator so motor can be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

L. Metal Finish:

1. Factory Prime Steel Finish: Compatible with field-applied finish and in manufacturer's standard color. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
2. Anodized Aluminum Finish: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
    a. Clear Anodized Finish: Manufacturer's standard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches apart.
2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Power-Operated Doors: Install automatic garage doors openers in accordance with UL 325.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.

D. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083613

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fixed and/or operable aluminum-framed windows for exterior locations.

B. Related Sections include the following:

1. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
2. Division 08 Section "Glazing" for additional glazing requirements for aluminum windows.

1.3 DEFINITIONS

A. Performance class designations according to AAMA/WDMA/CSA 101/I.S.2/A440-08:

1. AW: Architectural.

B. Performance grade number according to AAMA/WDMA/CSA 101/I.S.2/A440-08:

1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

D. Minimum Test Size: Smallest size permitted for performance class (gateway test size) or as specified elsewhere in this section, whichever is more stringent. Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class. Downsized test reports will not be considered acceptable.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:

1. Horizontal Sliding Windows: 99” x 79”.

2. Projected Windows: 60” x 144” (F/PO/F/PI).

B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units of the minimum test size specified herein that pass AAMA/WDMA/CSA 101/I.S.2/A440-08, Uniform Load Structural and Uniform Load Deflection Tests:

1. Uniform Load Structural Test: 105 (slider), 150 (projected) psf (positive and negative).
2. Uniform Load Deflection Test: 70 (slider), 100 (projected) psf (positive and negative).

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:

1. Mullion details, including reinforcement and stiffeners.
2. Joinery details.
3. Weather-stripping details.
4. Thermal-break details.
5. Glazing details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar samples of hardware and accessories involving color selection.

D. Maintenance Data: For operable window sash, operating hardware and finishes to include in maintenance manuals.

E. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Product Qualifications: In order to confirm that the proposed product(s) conform to the material and performance requirements contained in these specifications, bidders shall include the following with their bid. Failure to comply with these requirements shall cause the bid to automatically be rejected.

1. Bidder's Acknowledgement: Bidders shall include a letter in their bid stating the manufacturer and series (model) number of the product upon which its bid has been based. Changes in product (manufacturer or series) will not be permitted after the bid.
2. Product Data: Bidders submitting bids based on products other than the Basis of Design product listed in Paragraph 2.1 must also include the following with their bid:
   a. Comprehensive test reports not more than four years old prepared by a qualified testing agency for each product type being used on the project demonstrating compliance with the air, water and structural requirements outlined herein. Test reports based on the use of downsized test units will not be accepted.
   b. Thermal simulations prepared by a qualified independent testing agency for each product type being used on the project demonstrating compliance with the thermal transmittance requirements outlined in Paragraph 2.3.
   c. Full size product details showing all frame and sash details, dimensions, thermal break construction, wall thicknesses and joinery. Details must accurately reflect all glazing and hardware options specified herein.

B. Product Requirements: For maximum performance, windows for this project must meet both the testing requirements as contained herein and the minimum material requirements specified. Windows that carry the applicable AAMA rating but do not meet the material thicknesses, depths, etc. shall not be acceptable for use on this project.

C. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

D. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

E. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Fenestration Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, "Standard/Specification for Windows, Doors, and Unit Skylights" for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

G. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

H. Preinstallation Conference: If requested, conduct conference at project site to review methods and procedures related to aluminum windows including, but not limited to, the following:

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components.
3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.7 PROJECT CONDITIONS

A. Field Measurements: For retrofit installations, verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.

b. Structural failures including excessive deflection, water leakage, or air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of metals or other materials beyond that which is normal.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: Two years from date of Substantial Completion.
b. Insulated Glazing: 10 years from date of Substantial Completion.
c. Painted Metal Finishes:
1) Five years from date of Substantial Completion for AAMA 2603 Baked Enamel Finishes.
2) Fifteen years from date of Substantial Completion for AAMA 2605 Superior Performance Finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The basis of design for these specifications is the Series 6700i Horizontal Sliding, Series 3000i Projected as manufactured by Architectural Window Manufacturing Corporation, Rutherford, New Jersey.

B. Equivalents: Subject to compliance with all material and performance requirements outlined in these specifications, “or equal” products by other manufacturers will be considered for use subject to review by the Architect. The Architect’s decision regarding equivalency is final.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.080-inch thickness at any location for the main frame and sash members, except the frame of the slider sill shall be a minimum of 0.125-inch.

B. Frame/Sash Depth: 4 ¼” (slider), 3 ½” (projected) minimum frame depth; 1 3/4” (slider), 3 ½” (projected) minimum sash depth.

C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

1. All fasteners must be concealed except where unavoidable for application of hardware.
2. For application of hardware, where required, use non-magnetic stainless steel phillips machine screws.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.

1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA/CSA 101/I.S.2/A440-08.

F. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

G. Replaceable Weather Seals: Comply with AAMA 701/702.

H. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOW

A. Window Type: Horizontal Sliding – Double Slide (Single Slide products will not be acceptable), Projected

B. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440-08.

1. Performance Class and Grade: AW-PG70 (slider), AW-PG100 (projected).

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested with insulating glass for thermal performance according to AAMA 1503, showing a minimum CRF of 57 (slider), 56 (projected).

D. Thermal Transmittance: Provide aluminum windows with whole-window U-factor and SHGC maximums indicated when simulated in accordance with NFRC 100 and NFRC 200 at a model size of 72” x 48” (slider), model size 59” x 24” project-out and glazed with 1” Argon filled sputter coat Low-E (#2) insulated glass using a warm edge spacer.

1. U-Factor: 0.39 (slider), 0.44 (projected) Btu/sq. ft. x h x deg F or less.
2. SHGC: 0.28 (slider), 0.25 (projected).

E. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA/CSA 101/I.S.2/A440-08, Air Infiltration Test.

1. Maximum Rate: 0.20 (slider), <0.01 (projected) cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa).

F. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.

1. Test Pressure: 20 percent of positive design pressure, but not more than 12 (slider), 20 (projected) lbf/sq. ft.

G. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.

H. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA/CSA 101/I.S.2/A440-08.

I. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08 for operating window types indicated.

2.4 INSULATED GLAZING

A. Construction: All windows (except those receiving insulated panels) shall be factory glazed with hermetically sealed 1" insulating glass units with a dual seal of polyisobutylene and silicone and a desiccant filled spacer. Insulated glass must be set into a continuous bed of silicone sealant and held in place with removable extruded aluminum snap-in beads. Wrap around (marine) glazing which requires the removal and disassembling of the sash for re-glazing will not be acceptable. Units must be IGCC certified for a CBA rating level.

1. See specification section 08853 Security Glazing
2.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals.

B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

C. Horizontal Sliding Windows: Provide the following operating hardware:

1. Sash Rollers: Two tandem Delrin self-lubricating roller assemblies with stainless steel ball-bearing rollers. Sash rollers must be height adjustable with sash in place. Products requiring sash removal to adjust roller height will not be accepted.
2. Removable Lift-Out Sash: Design windows whereby both sashes operate for ventilation and are removable from inside for cleaning and maintenance (Products of "XO" design with only one operable/removable sash will not be acceptable).
3. Sill Cap/Track: Extruded-aluminum integral raised track of thickness dimensions, and profile indicated; designed to comply with performance requirements indicated and allow for drainage into the tank and to the exterior through concealed weeps with hinged covers.
4. Roller Assemblies: Low-friction design.
5. Sash Lock: Spring-loaded black zinc die cast plunger lock with black anodized aluminum keeper on meeting rails.
6. Sash Lock: Spring-loaded, aluminum snap-type lock at end jamb of exterior ("0") sash.
7. Limit Device: Continuous extruded aluminum sash stop limit device with rubber bumper; for each operable sash; mounted at window sill. Limit the opening to 6".

D. Projected Windows: Provide the following operating hardware:

1. Hinge: Concealed stainless steel four-bar friction hinge with adjustable-slide friction shoe; two per ventilator.
2. Lock: Cam-action, white bronze locking handle and keeper (two per ventilator over 42" wide).
3. Limit Device: Integral adjustable stainless steel, stop (two per ventilator).

2.6 ACCESSORIES

A. Rescue Labels: Windows designated on drawings as "Rescue" or "Egress" windows shall meet all applicable codes and shall include a conforming label.

2.7 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed (products with exposed thermal barriers will not be acceptable), low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. No thermal short circuits shall occur between the exterior and interior.
3. The thermal barrier shall be INSULBAR® or equal and shall consist of two glass reinforced polyamide nylon 6/6 struts mechanically crimped in raceways extruded in the exterior and interior extrusions.
4. Poured and debridged urethane thermal barriers shall not be permitted.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

F. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

G. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch- thick extruded aluminum. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

H. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440-08.

I. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

J. Muntins: Where shown on drawings, muntins shall be 3/8” deep profiled extruded aluminum applied to the exterior of nominal 1” deep insulating glass. Roll formed muntins shall not be acceptable. Exterior applied muntins, where applicable, must be pinned to an integral bevel on the frame or sash. Products using applied bevels will not be accepted.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Exterior of Window:

1. Superior-Performance Organic Finish: AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturer's written instructions.

    a. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat thermocured system consisting of specially formulated inhibitive primer [and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
    b. Color: Architectural Bronze

D. Interior of Window:
1. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

    a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603.
    b. Color: Colonial White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FACTORY TESTING

A. One window for each seventy-five manufactured shall be randomly selected by the Owner and Architect to be tested at the manufacturer's facility for air and water infiltration in order to confirm compliance of the project's windows with the performance requirements contained in these specifications. Bidders are to include the cost of transportation, food, and lodging for four representatives of the Owner and/or Architect to witness these tests.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: If desired, Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method A. Field test pressures and allowable limits shall be as factored by AAMA 502 from those minimums required to determine laboratory compliance with the applicable Performance Class and Grade pursuant to AAMA/WDMA/CSA 101/I.S.2/A440-08.
2. Testing Extent: One window as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
3. Test Reports: Shall be prepared according to AAMA 502.

C. Remediate noncomplying windows and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of remediated doors or additional work with specified requirements.

3.5 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

B. Manufacturer shall clean all glass and aluminum prior to shipment.

C. Protection of newly installed windows and/or final cleaning of glass and aluminum to remove any accumulations that may have occurred during the construction period is to be the responsibility of the General Contractor or Owner.

D. Comply with manufacturer's written recommendations for final cleaning and maintenance.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system.

END OF SECTION 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:
   a. Swinging doors.
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
2. Section 081216 "Aluminum Frames" for door silencers provided as part of aluminum frames.
3. Section 083313 "Coiling Counter Doors" for door hardware provided as part of overhead coiling door assemblies.
4. Section 284621.11 "Addressable Fire-Alarm Systems" for connections to building fire-alarm system.

1.2 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

B. Keying Conference: Conduct conference at Project site .

1. Conference participants shall include Installer's Architectural Hardware Consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
   a. Flow of traffic and degree of security required.
   b. Preliminary key system schematic diagram.
   c. Requirements for key control system.
   d. Requirements for access control.

e. Address for delivery of keys.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

D. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:
   a. Identification number, location, hand, fire rating, size, and material of each door and frame.
   b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
   c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
   d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
   e. Fastenings and other installation information.
   f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
   g. Mounting locations for door hardware.
   h. List of related door devices specified in other Sections for each door and frame.

E. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For and .

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and schedule.

1.7 MAINTENANCE MATERIAL SUBMITTALS

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC) and an Electrified Hardware Consultant (EHC) .

1.9 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of doors and door hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
   a. Electromagnetic Locks: Five years from date of Substantial Completion.
   b. Exit Devices: Two years from date of Substantial Completion.
   c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC A117.1 .

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:
   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
   c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 CONTINUOUS HINGES

A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch- thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allegion plc.
   b. Hager Companies.
   c. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.

2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
3. Deadbolts: Minimum 1.25-inch bolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Lock Trim:

1. Description: As indicated on Drawings .
2. Levers: Forged .
   a. see drawings for type and function .
3. Escutcheons (Roses): Wrought .
4. Dummy Trim: Match lever lock trim and escutcheons.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

F. Bored Locks: BHMA A156.2; Grade 1 ; Series 4000.

G. Interconnected Locks: BHMA A156.12; Grade 1 ; Series 5000.

2.5 ELECTRIC STRIKES

A. Electric Strikes: BHMA A156.31; Grade 1 ; with faceplate to suit lock and frame.

2.6 EXIT LOCKS AND EXIT ALARMS

A. Exit Locks and Alarms: BHMA A156.29, Grade 1.

2.7 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

2.8 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

2.9 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.

B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Removable.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.10 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. Existing System:

a. Master key or grand master key locks to Owner's existing system.
b. Re-key Owner's existing master key system into new keying system.

2. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver .

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
a. Notation: "DO NOT DUPLICATE."

2.11 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

2.12 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release ; and with internal override.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22.

2.13 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.14 CLOSER HOLDER RELEASE DEVICES

A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system .

2.15 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per ft. of door opening.

2.16 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.17 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

2.18 AUXILIARY ELECTRIFIED DOOR HARDWARE

2.19 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:
    a. Wood or Machine Screws: For the following:
        1) Hinges mortised to doors or frames.
        2) Strike plates to frames.
        3) Closers to doors and frames.
    b. Steel Through Bolts: For the following unless door blocking is provided:
        1) Surface hinges to doors.
        2) Closers to doors and frames.
        3) Surface-mounted exit devices.
3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.20 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule .
2. Furnish permanent cores to Owner for installation.

D. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

E. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

F. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

G. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing tapes.
6. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 088300 "Mirrors."
2. Section 088853 "Security Glazing."

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of the following products; 12 inches square.

1. Coated glass.
2. Laminated glass.
3. Insulating glass.

C. Glazing Accessory Samples: For sealants , in 12-inch lengths. Install sealant Samples between two strips of material representative in color of adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer .

B. Preconstruction adhesion and compatibility test report.

C. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 085113 "Aluminum Windows" to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain coated glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or

installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.
   a. Importance Factor: 1.5 .
2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
3. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick .
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm .

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Low-Iron Annealed Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent.

C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:

1. Construction: Laminate glass with polyvinyl butyral interlayer reinforced with polyethylene terephthalate film or cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard spacer material and construction .
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. EPDM with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   a. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces .

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 LAMINATED GLASS SCHEDULE

A. Clear Laminated Glass Type : Two plies of low-iron fully tempered float glass.

1. Minimum Thickness of Each Glass Ply: 4 mm .
2. Interlayer Thickness: 0.060 inch .
3. Safety glazing required.

B. Low-E-Coated, Laminated Vision Glass Type : Two plies of clear fully tempered float glass.

1. Minimum Thickness of Each Glass Ply: 4 mm .
2. Interlayer Thickness: 0.060 inch .
3. Low-E Coating: Pyrolytic or sputtered on second or third surface.
4. Safety glazing required.

3.8 INSULATING-LAMINATED-GLASS SCHEDULE

A. Low-E-Coated, Clear Insulating Laminated Glass Type :

1. Overall Unit Thickness: 1 inch .
2. Minimum Thickness of Outdoor Lite: 4 mm .
3. Outdoor Lite: Clear fully tempered float glass.
4. Interspace Content: Argon.
5. Indoor Lite: Clear laminated glass with two plies of annealed float glass.
   a. Minimum Thickness of Each Glass Ply: 4 mm .
   b. Interlayer Thickness: 0.060 inch .
6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
7. Safety glazing required.

END OF SECTION 088000

SECTION 088853 SECURITY GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Shooter Attack Certified Insulating Security Glazing

1.3 CODES AND REFERENCES:

A. FTD-SA – Filti Testing and Development, Standard for Shooter Attack certification

B. GSA – General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

C. ASTM F1642 – Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings

D. UL972 – Standard for Burglary Resistant Glazing

E. EN356 P4 – Testing Classification of Resistance Against Manual Attack

F. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

G. TAS 201, 202, 203 - FLORIDA BUILDING CODE (Dade County Small Missile Test) - Hurricane

H. 16 CFR 1201 – Safety Standard for Architectural Glazing Materials; Consumer Products Commission; current edition.

I. ANSI Z97.1 – American National Standard for Safety Glazing Materials Used in Building, Safety Performance Specifications and Methods of Test; 2010.

J. ASTM C 1036-06 – Standard Specification for Flat Glass

K. State Building Codes, Local Amendments.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Provide glazing systems produced by a manufacturer with not less than 5-years successful experience in the fabrication of assemblies of the type and quality required.

B. Installer's Qualifications: Glazed systems shall be installed by a firm that has not less than 5-years successful experience in the installation of systems like those required.

C. Source Limitations for Glass: Obtain all glass products from a single manufacturer.

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified independent agency.

1.5 SUBMITTALS

A. Submit under provisions of Division 1

B. Product Data: Manufacturers data sheets of each product to be used, including:

1. Preparation instructions and recommendation

2. Storage and handling requirements and recommendations

3. Installation methods.

C. Glazing Schedule:

1. Use same designations indicated on Drawings.

2. Listing types and thicknesses for each size, opening and location.

3. Samples:

a. Submit one 12" x 12" sample of each glass type specified

b. Submit one sample of each glazing sealant and/or glazing tape for color review.

4. Warranty: Warranty documents specified herein.

D. Certifications:

1. Certification that all sealants are fully compatible with the surfaces and finishes with which they are in applied.

2. Certification that all products comply with the test methods listed under Paragraph 1.3 Codes and References.

1.6 DELIVERY, STORAGE AND HANDLING

Deliver materials in manufacturer's unopened and undamaged packaging, with manufacturer's labels intact.

Protect glass and glazing materials from damage in ordinance with manufacturer's recommendations.

1.7 WARRANTIES

Low-E Glass: Warrant for 10 years from date of Delivery to be free of peeling or other deterioration of the Low-E coating.

Glazing Sealants: Warrant for 10 years per sealant manufacturer's standard warranty of merchantable quality. Warranty shall certify that cured sealants:

Will perform as a watertight weather-seal.

Will not become brittle or crack due to weathering or normal expansion and contraction of adjacent surfaces.

Will not harden beyond a Shore A durometer of 50, nor soften below a durometer of 10.

Will not change color when used with compatible back-up materials.

Will not bleed.

PART 2– PRODUCTS

2.1 MANUFACTURER'S

A. Acceptable Manufacturer: Armoured One, LLC., Which is located at: 386 North Midler Ave. Syracuse, NY 13206. Tel: 315-720-4186; Email: info@armouredone.com; Web: www.armouredone.com.

B. Substitutions: Not Permitted

C. Requests for substitutions will be considered in accordance with provisions in Division 1.

2.2 MATERIALS

A. Shooter/Attack Resistant Security Glass, Non-Rated Insulated**:** AOTSG1-IGU

1. Glass Type: Clear insulating panel

2. Overall Thickness: 1"

3. Outdoor light: ¼" Fully tempered

a. Coatings: Low-E

4. Inner space content:

   a. Argon

5. Indoor light: AOTSG516

6. Winter nighttime U-factor: 0.47

7. Summer daytime U-factor: 0.50

8. Visible Light Transmittance (VLT): 87%

9. Solar heat gain: 0.81 maximum

10. Visible light reflectance (interior and exterior): 15%

11. Light to Solar Gain (LSG): 1.09

12. FTD-SA – Standard for Shooter Attack certification Class 6.

13. GSA-Level 2 – General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

14. ASTM F1642 – Standard Test Method for Glazing and Glazing Systems Subject to Air blast Loadings.

15. UL972 – Standard for Burglary Resisting Glazing.

16. EN356 P4 – European Standard for Testing and Classification of Resistance against manual attack.

17. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

18. TAS 201, 202, 203 - FLORIDA BUILDING CODE (Dade County Small Missile Test) - Hurricane

19. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Consumer Products Safety Commission; current edition.

20. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

B. GLAZING MATERIAL

1. General: Comply with manufacturer's recommendations for applications and conditions at time of installation.

2. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

3. Setting Blocks: Neoprene, silicone or EPDM, 70-90 durometer hardness, with proven compatibility with glazing materials used.

4. Spacers: Neoprene, silicone or EPDM, 40-50 durometer hardness with proven compatibility with glazing materials used.

5. Compressible Fillers: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

C. FABRICATION

1. Cut glass to full fit and play, consistent with glass and glazing material manufacturers' recommendations and the requirements of the Drawings and References, Codes and Standards Article.

2. Follow code requirements and glass manufacturer's recommendations for minimum bite and edge and face clearances.

3. Cut lights to smooth straight edges, clean, free of nicks and flares; nipping not permitted. Follow glass manufacturer's directions exactly for tinted and Low-E glass

4. Glass Identification:
   a. Glazing in fire rated doors and fire rated windows shall bear UL classification marking in accordance with UL 9.
   b. Manufacturer's and UL identifications for glazing shall be permanently etched to be visible after glass has been set in place and glazed.

PART 3 EXECUTION

3.1 GENERAL

Each glazing installation must withstand normal temperature changes, and impact loading without failure of glass, failure of sealants or gaskets, deterioration of glazing materials and other defects in the work.

Protect glass from damage during handling and installation, and subsequent operation of glazed components of the work. Discard units with edge damage or other imperfections.

Glazing channel dimensions are intended to provide for necessary bite on glass, minimum edge clearance, and adequate tape or sealant thicknesses, with reasonable tolerances.

Comply with recommendations by manufacturers of glass and glazing products, except where more stringent requirements are indicated, including those of referenced glazing standards.

3.2 PREPARATION

Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate.

Where sealants are used, apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.3 INSTALLATION

Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

Where sealants are used at butt joints, apply sealant in thin continuous clear bead. Tool sealant to a uniform, continuous, even profile.

Apply glazing stops and clean up any excess structural sealants from finished surfaces.

Conform to recommendations of glass manufacturer where such covers points not shown on Drawings or specified herein.

Remove "loose" stops furnished with the units and reinstall as a part of the glazing operation.

Handle glass so as to prevent nicks and flares on glass edges.

Install glass exceeding 1/8" thickness on identical setting blocks permanently mounted and centered at 1/4 points. If necessary, to reduce deflection of horizontal supporting member, blocks may be placed at 1/8 points or with the nearest end 6" (whichever is greater) from edge of glass unit. Ensure that blocks are equidistant from centerline of glass. Do not obstruct weep holes.

Provide permanently mounted edge blocks at head and jambs of dry-glazed lights to prevent damage to glass edges during installation and lateral shifting of glass due to thermal and seismic loads and vibrations. Follow recommendations of Flat Glass Marketing Assn. Glazing Manual.

Set glass to maintain bite, edge and face clearance stipulated by code and the glass manufacturer.

Take special precautions to protect laminated glass edges from deterioration of vinyl interlayer by moisture.

Glaze dry-glazed aluminum doors and frames as per manufacturer's directions using glazing gaskets and seals furnished with the units.

Miter gaskets at corners and install so as to prevent pulling away at corners. Gaskets with gaps or other visible irregularities on door and window units shall be corrected by manufacturer or fabricator at no additional cost to University.

3.4 PROTECTION AND CLEANING

Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

Wash and polish glass on both faces, not more than 4 days prior to date scheduled for inspections intended to establish Date of Substantial Completion in each area of project. Comply with glass manufacturer's recommendations for final cleaning.

END OF SECTION 088853

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.2 ACTION SUBMITTALS

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association .

1.5 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installation.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Horizontal Deflection: For composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. .

B. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

C. Design Loads: As indicated on architectural Drawings or 5 lbf/sq. ft. minimum as required by the IBC.

2.2 FRAMING SYSTEMS

A. Studs and Track: ASTM C645 .

1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection .
2. Depth: As indicated on Drawings .

B. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Track System: ASTM C645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

C. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Steel Thickness: As indicated on Drawings .

E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings .
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Minimum Base-Steel Thickness: As indicated on Drawings .
2. Depth: As indicated on Drawings .

G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: hat shaped.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings .
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
   a. Install two studs at each jamb unless otherwise indicated.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Mold-resistant gypsum board.
4. Glass-mat, water-resistant backing board.
5. Cementitious backer units.
6. Water-resistant gypsum backing board.
7. Interior trim.
8. Joint treatment materials.
9. Laminating adhesive.

B. Samples for Initial Selection: For each type of trim accessory indicated.

1.3 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:
   a. Each level of gypsum board finish indicated for use in exposed locations.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

C. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: As indicated on Drawings .
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet .
2. Shapes:
   a. Cornerbead.
   b. Bullnose bead.
   c. LC-Bead: J-shaped; exposed long flange receives joint compound.
   d. L-Bead: L-shaped; exposed long flange receives joint compound.
   e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   f. Expansion (control) joint.
   g. Curved-Edge Cornerbead: With notched or flexible flanges.
   h. Base-of-Wall Galvanized Moisture Barrier Trim: Galvanized-steel sheet, 2 inches high.
   i. Base-of-Wall PVC Moisture Barrier Trim: Extruded PVC, 1-3/4 inch high.

B. Exterior Trim: ASTM C1047.

1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc .
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.7 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings .
2. Type X: Where required for fire-resistance-rated assembly .
3. Mold-Resistant Type: As indicated on Drawings .

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws .

3.4 FINISHING OF GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints , rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated .
   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.5 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Delegated-Design Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

A. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

B. Classification: Provide panels as follows:

1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1, nodular; with glass-fiber cloth overlay.
2. Pattern: E (lightly textured) .

C. Color: White .

D. Light Reflectance (LR): Not less than 0.85 .

E. Ceiling Attenuation Class (CAC): Not less than 35 .

F. Noise Reduction Coefficient (NRC): Not less than 0.80 .

G. Articulation Class (AC): Not less than 190 .

H. Edge/Joint Detail: Square Flush reveal sized to fit flange of exposed suspension-system members Beveled, kerfed, and rabbeted long edges and square, butt-on short edges .

I. Thickness: As indicated in a schedule .

J. Modular Size: As indicated on Drawings .

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate -duty system.
2. End Condition of Cross Runners: butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Cold-rolled steel .
5. Cap Finish: Painted white .

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
   a. Type: Postinstalled expansion anchors.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch- diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

E. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member .
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M , seismic design requirements, and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:
   a. As indicated on reflected ceiling plans.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet , non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet , non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

3.6 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thermoset-rubber base.
2. Rubber molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 THERMOSET-RUBBER BASE

A. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location:
   a. Style B, Cove: Provide in areas with resilient floor coverings .

B. Thickness: 0.125 inch.

C. Height: 4 inches .

D. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

E. Outside Corners: Preformed .

F. Inside Corners: Preformed .

G. Colors: As indicated by manufacturer's designations .

2.3 RUBBER MOLDING ACCESSORY

A. Description: Rubber transition strips .

B. Profile and Dimensions: As indicated .

C. Locations: Provide rubber molding accessories in areas indicated .

D. Colors and Patterns: As indicated by manufacturer's designations .

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Tightly adhere to substrates throughout length of each piece.
2. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.

1. Apply one coat(s).

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Full-size units of each color, texture, and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive floor tile during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

A. Tile Standard: ASTM F 1066, Class 2, through pattern .

B. Wearing Surface: Smooth .

C. Thickness: 0.125 inch .

D. Size: 12 by 12 inches.

E. Colors and Patterns: to be selected from manufactures standard colors .

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis .

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) .

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

H. Resilient Terrazzo Accessories: Install according to manufacturer's written instructions.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096723

EPOXY RESIN FLOORING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Section 03300 – Concrete and concrete placement shall be in compliance with ACI 302, ACI 224, ACI 503 and other applicable standards.

B. Floor drains Division 15 – Concrete must be adequately sloped to drain prior to placement of the Decor-Flor Troweled system.

C. Joint Sealants: Section 079200.

1.02 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of an epoxy based multi roller applied flooring system with Q28 colored quartz aggregate and urethane topcoat. The system shall have the color as specified by the Owner with a nominal thickness of 1/8 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations. Provide a coefficient of friction of no less than 0.42.

B. Cove base (if required) to be applied where noted on plans and per manufacturers standard details unless otherwise noted.

C. Type ECT Flooring and Base: Epoxy composition flooring and base not less than 1/4 inch thick composed of an epoxy resin matrix and mineral filler aggregate, lightly ground, with a cleanable urethane skid-resistant safety topping and sealed finish. Install on slope, concrete fill.

D. Installation of tapered cementitious fill to achieve floor slopes indicated on the drawings.

1.03 SUBMITTALS

A. Product Data: Submit printed product descriptions, physical properties data, color charts, specifications, and application instructions as applicable, for each material specified except reinforcement and sealants.

B. Samples:
1. Flooring and Base Combination: Each type and color; 12 inches x 12 inches x height of base plus one inch, complete with dividing strip at the toe and bead at top of base. Mount sample on plywood.
2. Underlayment Components: One quart.
3. Liquid Binder for Reinforcement: One quart.
4. Clear Sealer: One quart.

C. Quality Control Submittals:
1. Test Reports: At the request of the Director, furnish test reports from an independent testing laboratory showing that the submitted flooring materials meet or exceed specified physical properties and performance requirements.
2. Certificates: Affidavit required under Article 3.01.
3. Installer's Qualifications Data: Affidavit required under Quality Assurance Article.
4. List of Completed Installations: At the request of the Director, furnish a list of at least 5 comparable installations of the submitted flooring materials with a satisfactory service life of not less than 3 years.

D. Contract Closeout Submittals:
1. Maintenance Data: Deliver 2 copies of the flooring manufacturer's printed recommendations for cleaning and maintaining the installed flooring to the Director's Representative.

1.04 QUALITY ASSURANCE

A. Installer's Qualifications: The person supervising the Work of this Section and the workers installing the flooring system shall be personally experienced in epoxy resin flooring work and shall have been regularly employed by a company engaged in this type of flooring installation for a minimum of 3 years.
   1. Furnish to the Director the names and addresses of 5 similar projects which the foregoing people have worked on during the past 3 years.

B. Materials furnished for each type and color of flooring and base shall be from the same batch number.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Site in factory sealed containers, clearly labeled and marked with manufacturer's name, address, batch number, and date of manufacture.

B. Store materials in accordance with manufacturer's printed instructions.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

   1. Maintain temperature and relative humidity conditions necessary for proper installation and curing of the Work. Comply with flooring manufacturer's recommendations.
   2. Maintain sufficient ventilation in areas to receive the Work of this Section. Follow flooring manufacturer's recommendations.

   3. Lighting: Permanent lighting will be in place and working before installing decorative quartz epoxy flooring.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill:
   1. SikaQuick 1000® is a 1-component, rapid hardening, early strength gaining, patching material for concrete.
   2. For Thickness up to 2-1/2 inches: Flooring manufacturer's standard or recommended liquid binder, fillers, and aggregate.
   3. For Thickness of More than 2-1/2 inches: SikaQuick® 1000, add 3/8” gravel.

B. Underlayment: Liquid binder and filler recommended by the flooring manufacturer.

C. Waterproofing: in compliance with the flooring manufacturer's printed recommendations:
   1. TRITOflex, spray-able, 2 component liquid formulation.
   2. Spray-applied instant setting liquid waterproofing manufactured by Triton Inc.™ and applied by a manufacturer certified installer. The liquid TRITOflex product is water based and solvent free which transforms into a seamless rubberized roof membrane as it is spray-applied to the substrate and catalyzed by an accelerator component. The liquid is spray-applied in a single coat to achieve a minimum monolithic membrane thickness of 80 dry mils.

D. Reinforcement: Continuous filament swirl or woven glass fabric, not less than 4 oz per sq yd, embedded in latex or resin binder.

E. Primer: Flooring manufacturer's standard or recommended type.

F. Type ECT Flooring and Base:
1. Epoxy Resin Matrix: Two component epoxy resin base and epoxy curing agent; 100 percent solids, internally colored. Cured binder (matrix) shall be chemically resistant to the following reagents when tested in accordance with ASTM D-543, after immersion time of 7 days:
   a. Soap Solution (1 percent).
   b. Detergent (.025 percent).
   c. Hydrochloric Acid (37 percent).
   d. Acetic Acid (5 percent).
   e. Lactic Acid (5 percent).
   f. Citric Acid (20 percent).
   g. Gasoline (regular).
   h. Ethyl Alcohol.
   i. Uric Acid.
2. Aggregate Fillers: Clean, dry, and dust free inert aggregate. Type, size, color, and proportion recommended by the flooring manufacturer to produce flooring to match the approved sample.
3. Physical properties of cured flooring and base:
   a. Tensile Strength: 2000 psi min in accordance with ASTM C-307.
   b. Bond Strength: 10,000 psi min, after 7 days, in accordance with ASTM C-579.
   c. Bond Strength: 325 psi min, with concrete failure after 7 day water immersion, in accordance with ACI 403.
   d. Surface Hardness: Shore D Durometer 60 min in accordance with ASTM D-2240.
4. Safety Topping: Two component epoxy resin base and epoxy curing agent with colored siliceous aggregate. Provide a coefficient of friction of no less than 0.42.
5. Colors:
   a. Colors as indicated on the Drawings, or if not indicated, as selected by the Director from the manufacturer's standard range of colors. Colors chosen for the base may be different from the colors chosen for the flooring in the same area and may differ from space to space.

Industrial Floor Corporation
1. Sanseam Epoxy Quartz Floors flooring system.
   A. System Materials
      1. Primer: Manufacturers recommended product
      2. The quartz aggregate shall be Manufacturers recommended product
      3. Topcoat: Manufacturers recommended product satin.

   B. Patch Materials:
      1. Shallow Fill and Patching: Use Manufacturers recommended product
      2. Deep Fill and Sloping Material (over ¼ inch): Manufacturers recommended product.

G. Sealer: Flooring manufacturer's standard or recommended urethane clear sealer.

H. Metal Accessories:
1. Dividing Strips: Zinc, with 1/8 inch thick vertical leg.
2. Base Bead: 16 gage zinc, with one inch leg for attachment to wall.
3. Flashing: 24 oz copper.
4. Extension Collars for Existing Floor Drains: Non-ferrous metal recommended by flooring manufacturer.

I. Sealant: One-part, mildew resistant silicone sealant (Type 1D) specified in Section 079200.

J. SETTING MATERIALS
1. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

2. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397,4.0 mils(0.1 mm)thick.

3. Reinforcing Wire Fabric: Galvanized, welded wire fabric,2 by 2 inches(50.8 by 50.8 mm)by0.062-inch(1.57-mm)diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

4. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine surfaces scheduled to receive the Work of this Section for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Certification: Furnish affidavit by the flooring installer that the surfaces to receive the Work of this Section have been examined and are acceptable for application of the approved flooring. Do not install the flooring until such certification has been acknowledged by the Director in writing.

C. Examine substrates, areas, and conditions where epoxy will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required.

2. Verify that concrete/mortar substrates for epoxy floors installed comply with surface finish requirements

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prior to application of surface preparation materials, underlayments and flooring, remove dirt, paint, wax, and other foreign material that may prevent bonding of new materials. Vacuum the entire substrate to remove debris and dust.

B. Unless otherwise recommended by the flooring manufacturer in writing, prepare the substrate as follows:

1. New Concrete: Mechanically scarify the cured concrete surface, or wash it with a 10 percent muriatic acid solution and rinse thoroughly with clean water and let dry. Locate and mark expansion joints for later installation of dividing strips. Fill and level depressions, voids, cracks, and construction joints with underlayment.

E. Water Proofing Membrane

Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

1. Perform all related work as required by the Manufacturer necessary for the installation of the specified membrane system.
2. Evaluate the level of moisture in the substrate to determine that moisture levels are acceptable for application of the specified roofing system. Concrete substrates shall have a maximum moisture content of 6% and a maximum internal relative humidity of 75%. Verify the substrate is visibly dry and free of moisture. Capillary moisture is tested by plastic sheet method ASTM D4263.
3. Remove all dirt, debris, and loose materials from the surface of the substrate.
4. Substrate surface may be primed or sealed with a Manufacturer approved material in order to minimize the potential of vapor drive from existing moisture, chemicals, or release agents in concrete substrates. This determination should be made during the Pre-Project Approval process with the Designer and Manufacturer.

F. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 INSTALLATION

A. Fill: Place fill (or additional underlayment) where shown on the Drawings. For thickness up to 2-1/2 inches, use SikaQuick1000® as per recommendations. For thickness over 2-1/2 inches, use SikaQuick1000® with pea gravel.

C. Waterproof Membrane: Where waterproofing is shown on the Drawings, install membrane in accordance with the manufacturer's printed instructions. Unless otherwise detailed on the Drawings, carry the membrane up vertically to the top of the base, and down into the drain bodies.

a. Spray two-component TRITOflex instant-setting system as a continuous, monolithic and seamless membrane of uniform thickness, beginning at the lowest point and terminating at the highest point, up 6 inches on wall. Final membrane thickness after full cure must be minimum 80 mils dry.

b. When a spot repair is required during application, re-spray defect area within 15 minutes of initial spray application so entire membrane cures monolithically.

C. Reinforcement: Where waterproofing is not required, install reinforcement at intersections of horizontal and vertical surfaces of epoxy flooring. Unless otherwise dimensioned in the manufacturer's printed instructions, turn the reinforcing out onto the horizontal a minimum of 5 inches and up on the vertical to within one inch of the top of base. At floor drains, center a 30 inch square reinforcing membrane over the drain and turn down into drain body.

1. Existing Tile Floors: Install reinforcement over the entire floor area, and up on the vertical to within one inch of the top of base.

D. Metal Accessories: Install dividing strips, control joints, expansion joints, and base beads level and true to line. Set accessories in underlayment material to fill voids and substrate irregularities. Position the dividing strips, control joints, expansion joints, and base beads as required to serve as screeds for the required finish thickness of the flooring and base.

1. Control Joints: Where control joints appear in the floor slab, install a dividing strip in the epoxy flooring. Locate the strip vertically above the joint for the full length.

a. Saw-cut control joints (in lieu of installing dividing strips) where indicated. Cut joints after the flooring has cured, and fill joint with sealant, in accordance with the flooring manufacturer's recommendations.

2. Expansion Joints: Locate at existing building expansion joints and where shown on the Drawings. Carry expansion joints thru the entire flooring system. Where waterproofing membrane is called for, provide membrane joint treatment at expansion joints as recommended by the epoxy flooring manufacturer. Where expansion joint slip cover plates are not required, place a dividing strip on each side of joint and apply sealant as detailed on the Drawings or as recommended by the epoxy flooring manufacturer.
3. Install additional dividing strips at dividing lines between changes of color and types of flooring and base.
4. Install metal base bead along the top edge of projecting bases.
5. Flashings: Install flashings at pipes, conduits, and other items that penetrate thru the floor. Match the height of the wall base, unless otherwise shown on the Drawings.

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E. Flooring and Base:
1. Install flooring and base with a finished thickness of not less than 1/4 inch (exclusive of underlayments, surface preparation materials, waterproofing, and reinforcement). Comply with the manufacturer's printed application instructions, unless otherwise specified.
2. Depositing: Distribute the mix evenly and screed to the required thickness. Compact the mix to eliminate voids and air pockets.
   a. Deposit Limits: Schedule the Work so that, at the end of the work day, the applied flooring terminates at dividing strips, walls, or other definite borders. Terminate the Work by use of bond-breaking temporary screeds only where other methods cannot be executed and where continuation of Work will not leave any visible line in the finished flooring.
   b. Base: Install base of height and type indicated.

4. Grinding (Types EC and ECT): Lightly machine-grind the flooring with a No. 100 stone to obtain a uniform surface, free of trowel marks, waves or other imperfections. Clean and vacuum the floor. Check for voids, pits or other defects. Where required, fill defects with epoxy grout and regrind as necessary. Clean the floor in accordance with the manufacturer's recommendations. Let the floor dry completely before applying sealer.
5. Grinding Base (Types EC and ECT): Where necessary, hand-grind the base to eliminate trowel marks or other rough spots. Provide a surface that is uniformly textured and free of voids, pits, or other defects. Clean the base thoroughly before applying sealer.
6. Sealing Type ET Flooring and Type EC Flooring and Base: Vacuum Work surfaces to remove dust. Apply sealer in accordance with the manufacturer's printed instructions.
7. Applying Safety Topping (Type ECT Flooring and Base):
   a. Vacuum Work surfaces to remove dust.
   b. Apply topping binder and aggregate in accordance with manufacturer's printed instructions.
   c. After binder dries, remove loose aggregate and vacuum the surface to remove dust.
   d. Apply sealer in accordance with manufacturer's printed instructions.

END OF SECTION

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Finish coatings.
3. Floor sealers and paints.

B. Related Requirements:

1. Section 099600 "High-Performance Coatings" for tilelike coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range .

1. 10 percent of surface area will be painted with deep tones.

2.3 PRIMERS

A. Exterior, Alkali-Resistant, Water-Based Primer: Pigmented, water-based primer formulated for use on alkaline surfaces, such as exterior plaster, vertical concrete, and masonry.

B. Exterior Wood Preservative: Solvent-based, zinc or copper napthenate, penetrating antifungal treatment for exterior wood.

C. Exterior, Latex Wood Primer: White, waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on exterior wood subject to extractive bleeding.

D. Exterior, Alkyd/Oil Wood Primer: Alkyd/oil-based primer that is resistant to extractive bleeding when applied to wood substrates with less than 15 percent moisture content; formulated for sag, mold, and microbial resistance; for hiding stains; and for use on exterior wood subject to extractive bleeding.

E. Exterior, Latex Block Filler: Water-based, pigmented, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

1. Minimum Solids Content: Manufacturer's standard percentage solids by volume.

F. Water-Based Bonding Primer: Pigmented, water-based-emulsion primer formulated for exterior use and to promote adhesion of subsequent specified coatings.

G. Solvent-Based Bonding Primer: Pigmented, solvent-based primer formulated for exterior use and to seal substrates and promote adhesion of specified subsequent coatings.

H. Water-Based, Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, exterior ferrous metals subject to mildly corrosive environments.

I. Zinc-Rich, Inorganic Primer: Corrosion-resistant, inorganic-based, zinc-rich primer formulated for use on prepared steel subject to severe industrial or marine environments.

J. Surface-Tolerant Metal Primer: Corrosion-resistant, solvent-based metal primer formulated for use on structural steel and metal fabrications that have been minimally prepared.

K. Quick-Drying, Alkyd Metal Primer: Corrosion-resistant, solvent-based, modified-alkyd primer; lead and chromate free; formulated for quick-drying capabilities and for use on cleaned, exterior steel surfaces.

L. Alkyd Metal Primer: Corrosion-resistant, solvent-based, alkyd primer formulated for use on prepared ferrous metals subject to industrial and light marine environments.

M. Water-Based, Galvanized-Metal Primer: Corrosion-resistant, pigmented, acrylic primer; formulated for use on cleaned/etched, exterior, galvanized metal to prepare it for subsequent water-based coatings.

N. Epoxy Metal Primer: Corrosion-resistant, solvent-based, two-component epoxy primer formulated for use on prepared, exterior ferrous- and galvanized-metal surfaces.

O. Vinyl Wash Primer: Two-component, vinyl butyral/phosphoric acid, wash primer formulated for use over cleaned metal surfaces and zinc-rich primers as a tie coat for subsequent corrosion-resistant primers or finish coatings.

P. Quick-Drying Aluminum Primer: Corrosion-resistant, solvent-based, alkyd or modified-alkyd primer formulated for quick-drying capabilities and for use on prepared exterior aluminum.

2.4 FINISH COATINGS

A. Exterior Latex Paint, Flat: Water-based, pigmented coating; formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as portland cement plaster, concrete, and primed wood.

1. Gloss and Sheen: Maximum gloss of 5 units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .

B. Exterior Latex Paint, Low Sheen: Water-based, pigmented coating; formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as portland cement plaster, concrete, and primed wood.

1. Gloss and Sheen Level: Gloss of 10 to 35 units at 60 degrees and minimum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .

C. Exterior Latex Paint, Semigloss: Water-based, pigmented emulsion coating formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as masonry, portland cement plaster, and primed wood and metal.

1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .

D. Exterior Latex Paint, Gloss: Water-based, pigmented, acrylic-copolymer-emulsion coating formulated for alkali, mold, microbial, scrub, blocking (sticking of two painted surfaces), and water resistance and for use on exterior, primed, wood and metal trim, sashes, frames, and doors.

1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .

E. Exterior, High-Build Latex Paint: Water-based, high-build, pigmented, emulsion coating; high-solids content improves filling, uniformity, and film build on concrete masonry surfaces. Formulated for abrasion, mold, microbial, and wind-driven rain resistance and for use on exterior masonry, concrete masonry unit, and concrete surfaces.

1. Gloss and Sheen Level: Maximum gloss of 20 units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .
2. Minimum Solids Content: Manufacturer's standard percentage solids by volume.

F. Textured Latex Coating, Flat: Water-based, pigmented coating that contains sand or other hard aggregate and is formulated for use on exterior masonry, concrete masonry unit, and concrete surfaces.

1. Gloss and Sheen Level: Maximum gloss of 5 units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .
2. Aggregate Size: Medium .

G. Textured Latex Coating, Low Sheen: Water-based, pigmented coating that contains sand or other hard aggregate and is formulated for use on exterior masonry, concrete masonry unit, and concrete surfaces.

1. Gloss and Sheen Level: Gloss of 5 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .
2. Aggregate Size: Manufacturer's standard .

H. Exterior Alkyd Enamel, Flat: Solvent-based, pigmented, alkyd enamel formulated for mold, microbial, and water resistance and for use on exterior, primed, wood and metal surfaces.

1. Gloss and Sheen Level: Maximum gloss of 5 units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .

I. Exterior Alkyd Enamel, Semigloss: Solvent-based, pigmented, alkyd enamel formulated for mold, microbial, and water resistance and for use on exterior, primed, wood and metal surfaces.

1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .

J. Exterior Alkyd Enamel, Gloss: Solvent-based, pigmented, alkyd enamel formulated for mold, microbial, and water resistance and for use on exterior, primed, wood and metal surfaces.

1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .
2. Fineness of Grind: Manufacturer's standard .

K. Quick-Drying Alkyd Enamel, Semigloss: Solvent-based, alkyd or modified-alkyd enamel formulated for quick-drying capabilities and for use on exterior, primed, metal and dimensionally stable wood surfaces.

1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .

L. Quick-Drying Alkyd Enamel, Gloss: Solvent-based, alkyd or modified-alkyd enamel formulated for quick-drying capabilities and for use on exterior, primed, metal and dimensionally stable wood surfaces.

1. Gloss Level: Minimum gloss of 85 units at 60 degrees when tested in accordance with ASTM D523 .

M. Aluminum Paint: Aliphatic, solvent-based coating consisting of varnish or alkyd binder combined with aluminum pigment that is formulated for use as a stain-blocking coating and sealer on exterior wood, metal, bituminous-coated, and prepared masonry surfaces and to be able to be recoated with conventional alkyd and latex paints.

N. High-Build Epoxy Paint, Low Gloss: High-solids, two-component epoxy; formulated for use on exterior concrete, masonry, and primed-metal surfaces.

1. Gloss and Sheen Level: Maximum gloss of 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .

O. Exterior, Water-Based, Light Industrial Coating, Low Sheen: Corrosion-resistant, water-based, pigmented, emulsion coating formulated for resistance to blocking (sticking of two painted surfaces), water, alkalis, moderate abrasion, and mild chemical exposure and for use on exterior, primed, wood and metal surfaces.

1. Gloss and Sheen Level: Gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .

P. Exterior, Water-Based, Light Industrial Coating, Semigloss: Corrosion-resistant, water-based, pigmented, emulsion coating formulated for resistance to blocking (sticking of two painted surfaces), water, alkalis, moderate abrasion, and mild chemical exposure and for use on exterior, primed, wood and metal surfaces.

1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .

Q. Exterior, Water-Based, Light Industrial Coating, Gloss: Corrosion-resistant, water-based, pigmented, emulsion coating formulated for resistance to blocking (sticking of two painted surfaces), water, alkalis, moderate abrasion, and mild chemical exposure and for use on exterior, primed, wood and metal surfaces.

1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .

2.5 FLOOR SEALERS AND PAINTS

A. Latex Floor Paint, Low Gloss: Water-based, pigmented coating formulated to hide stains, for alkali and incidental water resistance, and for use on exterior, concrete and primed-wood surfaces subject to low to medium foot traffic.

1. Gloss and Sheen Level: Maximum gloss of 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .
2. Slip-Resistant Aggregate: Manufacturer's standard additive .

B. Latex Deck Coating: Water-based, high-solids, acrylic-emulsion coating; formulated for use on exterior, concrete and wood-board traffic surfaces.

1. Gloss Level: Manufacturer's standard .
2. Minimum Solids Content: Manufacturer's standard percentage solids by volume.
3. Surface Texture: Slip resistant.

C. Alkyd Floor Enamel, Gloss: Solvent-based, alkyd enamel; self-priming where applied to bare wood; formulated to hide stains, for durability, for microbial and abrasion resistance, and for use on exterior, wood-board, traffic surfaces.

1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .
2. Slip-Resistant Aggregate: Manufacturer's standard additive .

D. Water-Based, Concrete-Floor Sealer: Clear, water-based, acrylic-copolymer-emulsion sealer formulated for oil, gasoline, alkali, and water resistance and for use on exterior, concrete traffic surfaces.

E. Solvent-Based, Concrete-Floor Sealer: Clear, acrylic, solvent-based sealer formulated for oil, gasoline, alkali, and water resistance and for use on exterior, concrete traffic surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and Concrete Masonry Units): 12 percent.
4. Wood: 15 percent.

5. Portland Cement Plaster: 12 percent.
6. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is dry and sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 7/NACE No. 4.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and remove sanding dust.
3. Prime edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:
   a. Uninsulated metal piping.
   b. Pipe hangers and supports.
   c. Metal conduit.
   d. Plastic conduit.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.

3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Masonry Unit Substrates:

1. High-Build Latex System : Dry film thickness of not less than 10 mils.
   a. Prime Coat: As recommended in writing by topcoat manufacturer.
   b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
   c. Topcoat: Exterior, high-build latex paint.

B. Steel and Iron Substrates:

1. Water-Based, Light Industrial Coating System :
   a. Prime Coat: .
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Exterior, water-based, light industrial coating, semigloss .
2. Alkyd System :
   a. Prime Coat: Alkyd metal primer .
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Exterior alkyd enamel, semigloss .

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Solvent-based finish coatings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
2. Section 099600 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
   b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range .

1. Ten percent of surface area will be painted with deep tones.

2.3 PRIMERS

A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

B. Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.

C. Interior Alkyd Primer Sealer: Solvent-based, alkyd-type, primer/sealer for new interior wood, plaster, and porous surfaces,

2.4 WATER-BASED FINISH COATS

A. Interior, Latex, Flat: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Gloss and Sheen Level: Maximum gloss of five units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .

B. Interior, Latex, Low Sheen: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Gloss and Sheen Level: Maximum gloss of 10 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .

C. Interior, Latex, Eggshell: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Gloss and Sheen Level: Gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .

D. Interior, Latex, Satin: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Gloss and Sheen Level: Gloss of 20 to 35 units at 60 degrees and minimum sheen of 35 units at 85 degrees when tested in accordance with ASTM D523 .

E. Interior, Latex, Semigloss: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .

F. Interior, Latex, Gloss: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .

2.5 SOLVENT-BASED FINISH COATS

A. Interior, Alkyd, Eggshell: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.

1. Gloss and Sheen Level: Gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .

B. Interior, Alkyd, Semigloss: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.

1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .

C. Interior, Alkyd, Gloss: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.

1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.
5. Gypsum Board: 12 percent.
6. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 7/NACE No. 4.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.
   d. Metal conduit.
   e. Plastic conduit.
   f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   g. .
2. Paint the following work where exposed in occupied spaces:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.

d. Metal conduit.
e. Plastic conduit.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Other items as directed by Architect.
h. .

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. High-Performance Architectural Latex System :
   a. Block Filler: Interior/exterior latex block filler.
   b. Prime Coat: Alkali-resistant, water-based primer.
   c. Intermediate Coat: Matching topcoat.
   d. Topcoat: Interior, latex, high-performance architectural coating, .

B. Steel Substrates:

1. Alkyd System :
   a. Prime Coat: .
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior, alkyd, eggshell semigloss gloss.
2. Alkyd over Surface-Tolerant Primer System :
   a. Prime Coat: Surface-tolerant metal primer.
   b. Intermediate Coat: Matching topcoat.

c. Topcoat: Interior, alkyd, eggshell semigloss gloss.

C. Galvanized-Metal Substrates:

1. Alkyd over Cementitious Primer System :
   a. Prime Coat: Cementitious galvanized primer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior, alkyd, eggshell semigloss gloss.

D. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Alkyd System :
   a. Prime Coat: Primer, .
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior, alkyd, eggshell semigloss .

E. Gypsum Board and Plaster Substrates:

1. Latex over Latex Sealer System :
   a. Prime Coat: Interior latex primer sealer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior, latex, flat low sheen eggshell satin semigloss gloss.

F. Insulation-Covering Substrates: Including .

END OF SECTION 099123

SECTION 099600
TEXTURED ACRYLIC FINISHES

PART I GENERAL

1.01 SUMMARY
A. Textured Acrylic Finishes on existing CMU building

B. Related Sections
1. Masonry Repointing – Section 04 0120.63.

1.02 REFERENCES
A. Section Includes:
1. ASTM B 117 (Federal Test Standard 141A Method 6061) Standard Practice for Operating Salt Spray (Fog) Apparatus.
2. ASTM C 67 Test Method for Sampling and Testing Brick and Structural Tile.
3. ASTM C 150 Standard Specification for Portland Cement.
4. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
5. ASTM C 578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
6. ASTM D 968 (Federal Test Standard 141A Method 6191) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
7. ASTM D 2247 (Federal Test Standard 141A Method 6201) Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
8. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
9. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
10. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
11. ASTM E 96 Standard Test Method for Water Vapor Transmission of Materials.
12. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
13. ASTM E 2098 (Formerly EIMA Method 105.01) Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish Systems (EIFS) after Exposure to Sodium Hydroxide Solution.
14. ASTM E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
15. ASTM E 2430 Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
16. ASTM E 2485 (formerly EIMA Std. 101.01) Standard Test Method for Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water-Resistive Barrier Coatings
17. ASTM E 2486 (formerly EIMA Std. 101.86) Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
18. ASTM G 154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
19. ASTM G 155 (Federal Test Standard 141A Method 6151) Standard Practice for Operating-Xenon Arc Light Apparatus, for Exposure of Nonmetallic Materials.
20. ICC ES AC219 Exterior Insulation and Finish Systems.

1.03 DEFINITIONS

A. Contractor: The contractor that applies materials to the substrate.
B. Dryvit: Dryvit Systems, Inc., the manufacturer of the coating materials, a Rhode Island corporation.
C. Lamina: The layer consisting of the reinforced base coat and finish materials.
D. Finish: An acrylic based finish, available in a variety of textures and colors, which is applied to the prepared wall surface.
E. Reinforced Base Coat: The layer consisting of fiberglass reinforcing mesh fully embedded in the base coat material applied to the outside surface of the substrate.
F. Reinforcing Mesh: Glass fiber mesh used to reinforce the base coat.
G. Substrate: The material to which Dryvit TAFS are applied.

1.04 DESCRIPTION

A. Dryvit TAFS are exterior architectural coatings and are available in two configurations:
   1. Dryvit TAFS Option 2 consists of a Dryvit base coat, Dryvit reinforcing mesh, Dryvit acrylic primer (when specified) and Dryvit acrylic finish applied to various substrates.
B. Design Requirements
   1. Acceptable surfaces for Dryvit Textured Acrylic Finishes include:
      a. Poured-in-place and precast concrete.
      b. Unglazed brick and masonry units.
      c. Cement plaster.
      d. Insulated Concrete Forms (ICF'S) (TAFS Option 2 only) – Refer to Dryvit ICF specification DS194.
      e. EPS surfaced panels (TAFS Option 2 only) meeting ASTM C 578 Type I Properties.
      f. Exterior cement and calcium silicate boards (without joints). NOTE: When bridging sheathing joints, refer to Dryvit Specification DS191.
   2. Deflection of substrate systems shall not exceed 1/240 times the span.
   3. Substrate systems shall be designed to meet all local building code requirements and shall be approved for use on this project.
   4. Vapor Retarders – The use and location of vapor retarders within a wall assembly is the responsibility of the project designer and shall comply with local building code requirements. The type and location shall be noted on the project drawings and specifications. Vapor retarders may be inappropriate in certain areas and can result in condensation within the wall assembly. Refer to Dryvit Publication DS159, for additional information.
   5. Projecting surfaces shall have a minimum slope of 6:12 and maximum length of 12 in (305 mm).
   6. The substrate shall be clean, smooth, planar and free of surface imperfections that would interfere with application of a surface coating.
   7. Dryvit texture acrylic finishes (TAFS) are limited to above grade uses.
   8. Dark Colors – For application over EPS, the use of dark colors must be considered in relation to wall surface temperature as a function of local climatic conditions. Use of dark colors in high temperature climates can affect the performance of the EPS substrate.
   9. Sealants
      a. Shall be manufactured and supplied by others.
      b. Shall be compatible with Dryvit TAFS materials. Refer to current Dryvit publication DS153, for listing of sealants tested by sealant manufacturers for compatibility.
      c. The sealant backer rod shall be closed cell.

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C. Performance Requirements: As a minimum, the Dryvit materials shall be tested as follows:

1. Durability:

TEST	TEST METHOD	CRITERIA	RESULTS
Abrasion Resistance	ASTM D 968	No deleterious effects after 528 quarts (500 liters)	No deleterious effects after 1056 quarts (1000 liters)
Accelerated Weathering	ASTM G 155 Cycle 1	No deleterious effects after 2000 hours	No deleterious effects after 5000 hours
	ASTM G 154 Cycle 1 (QUV)		No deleterious effects after 5000 hours
Freeze-Thaw	ASTM E 2485 (formerly EIMA 101.01)	No deleterious effects after 60 cycles	Passed - No deleterious effects after 90 cycles
	ASTM C 67 modified	No deleterious effects after 60 cycles	Passed - No deleterious effects after 60 cycles
	ICC ES Procedure	No deleterious effects after 10 cycles	Passed - No deleterious effects after 10 cycles
Mildew Resistance	ASTM D 3273	No growth during 28 day exposure period	No growth during 60 day exposure period
Moisture Resistance	ASTM D 2247	No deleterious effects after 14 days exposure	No deleterious effects after 42 days exposure
Taber Abrasion	ASTM D 4060	N/A	Passed 1000 cycles
Salt Spray Resistance	ASTM B 117	No deleterious effects after 300 hours exposure	No deleterious effects after 1000 hours exposure
Water Penetration***	ASTM E 331 ICC ES (AC219)	No water penetration beyond the inner-most plane of the wall after 2 hours at 6.24 psf (300 Pa)	Passed
Alkali Resistance of Reinforcing Mesh	ASTM E 2098 (formerly EIMA 105.01)	> 120 pli (21dN/cm) retained tensile strength after exposure	Passed
Water Vapor Transmission	ASTM E 96	Vapor permeable	EPS 5 perm-inch Base Coat* 40 perms Finish** 40 perms
Tensile Bond	ASTM C 297/E 2134	Minimum 15 psi (104 kPa) – substrate or insulation failure	Minimum 19.1 psi (132 kPa)
* Based on Dryvit Genesis® ** Based on Dryvit Quarzputz® *** TAFS Option 2			

2. Impact Resistance: In accordance with ASTM E 2486 (formerly EIMA Standard 101.86):

Reinforcing Mesh[1]/Weight oz/yd² (g/m²)	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range in-lbs (Joules)		Impact Test Results in-lbs (Joules)	
Standard - 4.3 (146)	150 lbs/in (27 g/cm)	Standard	25-49	(3-6)	36	(4)
Standard Plus™ - 6 (203)	200 lbs/in (36 g/cm)	Medium	50-89	(6-10)	56	(6)
Intermediate™ - 12 (407)	300 lbs/in (54 g/cm)	High	90-150	(10-17)	108	(12)
Panzer® 15[2] - 15 (509)	400 lbs/in (71 g/cm)	Ultra High	>150	(>17)	162	(18)
Panzer 20[2] - 20.5 (695)	550 lbs/in (98 g/cm)	Ultra High	>150	(>17)	352	(40)
Detail Mesh® Short Rolls – 4.3 (146)	150 lbs/in (27 g/cm)	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 7.2 (244)	274 lbs/in (49 g/cm)	n/a	n/a	n/a	n/a	n/a
1. It shall be colored blue and bear the Dryvit logo for product identification 2. Shall be used in conjunction with Standard Mesh Values based on testing over EPS substrate						

3. Fire performance

TEST	TEST METHOD	CRITERIA	RESULTS
Flame Spread	ASTM E 84	All components shall have a Flame Spread Index ≤ 25 Smoke Developed Index ≤ 450	Passed

1.05 SUBMITTALS

A. Product Data: The contractor shall submit to the owner/architect manufacturer's product data sheets describing products, which will be used on the project.

B. Samples: The contractor shall submit to the owner/architect two samples of each finish, texture, and color to be used on the project. The same tools and techniques proposed for the actual installation shall be used to prepare the samples. Samples shall be of sufficient size to accurately represent each color and texture to be utilized on the project.

C. Test Reports: When requested, the contractor shall submit to the owner/architect copies of selected test reports verifying the performance of the system materials.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer: Shall be Dryvit Systems, Inc. All materials shall be manufactured or sold by Dryvit and shall be purchased from Dryvit or its authorized distributor.
   a. Materials shall be manufactured at a facility covered by a current ISO 9001:2015 and ISO 14001:2015 certification. Certification of the facility shall be done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
2. Contractor: Shall be knowledgeable in the installation of the Dryvit materials and shall be experienced and competent in the application of Dryvit Textured Acrylic Finishes.

1.07 DELIVERY, STORAGE, AND HANDLING

A. All Dryvit materials shall be delivered to the job site in the original, unopened packages with labels intact.

B. Upon arrival, materials shall be inspected for physical damage, freezing, or overheating. Questionable materials shall not be used.

1. Materials shall be stored at the job site, and at all times, in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Minimum storage temperature shall be as follows:
   a. DPR, PMR™, HDP™, Weatherlastic® and E™ Finishes, Color Prime™, Primus®, Genesis® and NCB™: 40 °F (4 °C).
   b. For other products, refer to specific product data sheets.
2. Maximum storage temperature shall not exceed 100 °F (38 °C). NOTE: Minimize exposure of materials to temperatures over 90 °F (32 °C). Finishes exposed to temperatures over 110 °F (43 °C) for even short periods may exhibit skinning, increased viscosity and should be inspected prior to use.

C. Protect all products from inclement weather and direct sunlight.

1.08 PROJECT CONDITIONS

A. Environmental Requirements

1. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
2. At the time of Dryvit product application, the air and wall surface temperatures shall be from 40 °F (4 °C) minimum to 100 °F (38 °C) maximum for the following products:
   a. DPR, PMR, HDP, Weatherlastic and E Finishes™, Color Prime, Primus, Genesis and NCB.
   b. For other products, refer to specific product data sheets.
3. These temperatures shall be maintained with adequate air ventilation and circulation for a minimum of 24 hours (48 hours for Weatherlastic Finishes, Ameristone, and TerraNeo) thereafter, or until the products are completely dry. Refer to published product data sheets for more specific information.

B. Existing Conditions: The contractor shall have access to electric power, clean water, and a clean work area at the location where the Dryvit materials are to be applied.

1.09 SEQUENCING AND SCHEDULING

A. Installation of the Dryvit Textured Acrylic Finishes shall be coordinated with other construction trades.

B. Sufficient manpower and equipment shall be employed to ensure a continuous operation, free of cold joints, scaffold lines, texture variations, etc.

1.10 LIMITED MATERIALS WARRANTY

A. Dryvit Systems, Inc. shall provide a written limited materials warranty against defective materials, upon written request. Dryvit shall make no other warranties, expressed or implied. Dryvit is not liable for incidental or consequential damages. Dryvit does not warrant workmanship.

B. The applicator shall warrant workmanship separately. Dryvit shall not be responsible for workmanship associated with the installation of the Dryvit Textured Acrylic Finishes.

1.11 DESIGN RESPONSIBILITY

A. It is the responsibility of both the specifier and the purchaser to determine if a product is suitable for its intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings, and the like. Dryvit has prepared guidelines in the form of specifications and product data sheets to facilitate the design process only. Dryvit is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop

drawings, or the like, whether based upon the information prepared by Dryvit or otherwise, or for any changes which purchasers, specifiers, designers, or their appointed representatives may make to Dryvit's published comments.

1.12 MAINTENANCE
A. Maintenance and repair shall follow the procedures noted in Dryvit Outsulation System Application Instructions DS204.
B. All Dryvit products are designed to minimize maintenance. However, as with all building products, depending on location, some cleaning may be required. See Dryvit publication DS152, on Cleaning and Recoating.
C. Sealants, flashings and other building envelope components shall be inspected on a regular basis and repairs made as necessary.

PART II PRODUCT

2.01 MANUFACTURER
A. All Dryvit Textured Acrylic Finishes shall be obtained from Dryvit or its authorized distributors. Substitutions or additions of materials other than specified will void the warranty.

2.02 MATERIALS
A. Portland Cement: Shall be Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
B. Water: Shall be clean and free of foreign matter.

2.03 COMPONENTS
A. Base Coat (when specified) (required with TAFS Option 2 over EPS insulation): Shall be compatible with the substrate and reinforcing mesh(es).
1. Cementitious: A liquid polymer based material, which is field-mixed in a 1:1 ratio by weight with Portland cement.
a. Shall be Primus or Genesis.
2. Ready mixed: A dry blend cementitious, co-polymer based product, field mixed with water.
a. Shall be Primus® DM, Genesis® DM, Genesis® DMS, Rapidry DM 35-50 or Rapidry 50-75.
3. Noncementitious: A factory-mixed, fully formulated, water-based product.
a. Shall be NCB.
4. ShieldIt™: A 2-pass base coat used over existing EIFS or a Dryvit reinforced base coat to improve impact resistance against woodpeckers when specified.
B. Reinforcing Mesh(es) (when specified) (required with TAFS Option 2 over EPS insulation): Shall be a balanced open weave, glass fiber fabric treated for compatibility with other TAFS materials. NOTE: Reinforcing meshes are classified by impact resistance and specified by weight and tensile strength as listed in Section 1.04.C.2.
1. Shall be Standard, Standard Plus, Intermediate, Panzer 15, Panzer 20, Detail and Corner Mesh.
2. Shall be colored blue for product identification bearing the Dryvit logo.
C. Primers
1. Color Prime: Pigmented, acrylic based primer used to improve adhesion and uniformity of finish color.
2. Primer with Sand™: Pigmented acrylic based primer with sand improves adhesion and uniformity of finish color as well as application of trowel-applied finishes.
3. Color Prime-W™: A water based acrylic, semi transparent primer for use over cement plaster and other cementitious substrates. NOTE: Because it is semi transparent, tinted colors are affected by the color of the substrate.
D. Finish: Shall be the type, color and texture as selected by the architect/owner and shall be one or more of the following:
1. Standard DPR (Dirt Pickup Resistance): Water-based, acrylic coating with integral color and texture and formulated with DPR chemistry:
a
b. Sandblast®DPR: Medium texture
c. Freestyle® DPR: Fine texture

3. E: Water-based, lightweight acrylic coating with integral color and texture and formulated with DPR chemistry:
a. Quarzputz® E
b. Sandpebble® E
c. Sandpebble® Fine E
6. Medallion Series PMR (Proven Mildew Resistance): Water-based acrylic coating with integral color and texture and formulated with PMR chemistry:
c. Freestyle® PMR
7. Coatings and Sealers:
b. Demandit® Sanded

PART III EXECUTION

3.01 EXAMINATION
A. Prior to application of Dryvit TAFS, the contractor shall ensure that the substrate is of a type listed in Section 1.04.B.1.
B. Prior to the installation of Dryvit TAFS, the architect or general contractor shall insure that all needed flashings and other waterproofing details have been completed, if such completion is required prior to the application of Dryvit TAFS.

C. The contractor shall notify the general contractor and/or architect and/or owner of all discrepancies. Work shall not proceed until discrepancies have been corrected.

3.02 SURFACE PREPARATION

A. The substrates shall be prepared so as to be free of foreign materials such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellents, moisture, frost and any other materials that inhibit adhesion.

B. Concrete and masonry

1. Shall be dry and cured a minimum of 28 days.

G. Painted Surfaces

1. Shall be cleaned to remove all loose paint, dirt, dust, chalk, and any other materials that may inhibit adhesion.
2. Glossy surfaces shall be sanded to remove gloss and cleaned.
3. Test patches, located in inconspicuous areas should be prepared to verify adhesion. A minimum of one test every 500 ft^2 (46 m^2) of wall area is recommended.

3.03 INSTALLATION

A. The Dryvit materials shall be mixed and applied in accordance with current Dryvit printed product data sheets.

B. Masonry Surfaces

1. Apply a continuous layer of Genesis or Genesis DM mixture over the entire wall surface to fill voids and provide a smooth level base for primer and finish application. Application thickness shall not exceed 1/8 in (3 mm) in a single pass.
2. When specified, a layer of reinforcing mesh is embedded into the wet base coat mixture and troweled smooth.
3. Allow the base coat mixture to cure a minimum of 24 hours until completely dry. Cool, humid conditions may require longer cure times.
4. Using a brush, roller, or airless spray equipment, apply a coat of Color Prime or Primer with Sand over the dry base coat surface, and allow to dry.
5. Apply the specified finish in accordance with Dryvit's printed installation instructions.

G. Painted Surfaces

1. Apply the finish in accordance with Dryvit's printed installation instructions for the specified finish.
   NOTE: It is not recommended to skim painted surfaces with a cementitious base coat material.

H. When specified, the base coat shall be applied such that the overall minimum thickness shall be sufficient to fully embed the mesh. The recommended method is to apply the base coat in two (2) passes.

I. Sealant shall not be applied directly to textured finishes or base coat surfaces. Base coat surfaces which will be in direct contact with sealant shall be coated with Demandit Smooth or Color Prime.

3.04 FIELD QUALITY CONTROL

A. The contractor shall be responsible for the proper application of Dryvit TAFS.

B. Dryvit assumes no responsibility for on-site inspections or application of its products.

C. If required, the contractor shall certify in writing the quality of work performed relative to the substrate system, details, installation procedures, workmanship and as to the specific products used.

D. If required, the sealant contractor shall certify in writing that the sealant application is in accordance with the sealant manufacturer's and Dryvit's recommendations.

3.05 CLEANING

A. All excess Dryvit materials shall be removed from the job site by the contractor in accordance with contract provisions and as required by applicable law.

B. All surrounding areas, where Dryvit TAFS have been installed, shall be left free of debris and foreign substances resulting from the contractor's work.

3.06 PROTECTION

A. Dryvit TAFS shall be protected from weather and other sources of damage until dry and permanent protection in the form of flashings, sealants, etc. are installed.

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dimensional characters.
   a. Cutout dimensional characters.

1.2 DEFINITIONS

A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.3 COORDINATION

A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size .
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

1.7 QUALITY ASSURANCE

1.8 FIELD CONDITIONS

A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of finishes beyond normal weathering.
   b. Separation or delamination of sheet materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of dimensional character sign type(s) according to structural performance requirements.

B. Thermal Movements: For exterior fabricated channel dimensional characters , allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces .

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

A. Cutout Characters : Characters with uniform faces; square-cut, smooth , eased edges; precisely formed lines and profiles; and as follows:

1. Character Material: Sheet or plate aluminum .
2. Character Height: As indicated on Drawings .
3. Thickness: Manufacturer's standard for size of character .
4. Finishes:
   a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range .
   b. Painted Edges: Paint edges of acrylic characters with laminated metal facing as recommended in writing by manufacturer.
5. Mounting: Concealed studs .

2.3 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 316, stretcher-leveled standard of flatness.

E. Zinc Castings: ASTM B240, alloy and temper recommended by sign manufacturer for type of use and finish indicated.

F. Zinc Sheet: ASTM B69 , alloy and temper recommended by sign manufacturer for type of use and finish indicated.

G. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

H. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless steel devices unless otherwise indicated.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.8 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
2. Dull Satin Finish: No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that electrical service is correctly sized and located to accommodate signs.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF DIMENSIONAL CHARACTERS

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
   b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
   b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
4. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position, so that signage is correctly located and aligned.
5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101419

SECTION 101453 - TRAFFIC SIGNAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Installation of metal traffic signs

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 321216 – Asphalt Paving
C. Section 321313 – Concrete Paving

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project.

D. Closeout Procedures: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Design Requirements: Comply with the applicable requirements of New York State Department of Transportation Standard Specification, Section 645.

B. Regulatory Requirements: Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.05 SEQUENCING AND SCHEDULING

A. Proceed with and complete traffic signage installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Signs

1. Comply with applicable local and state requirements. Where local or state requirements are not applicable or available, comply with the latest edition of ASSHTO M268.
2. Provide size, shape, text, color and reflectivity as shown on the Contract Documents.

B. Posts

1. Heavy duty, 10'minimum 3 lb. per foot, green enamel U-channel posts.

C. Hardware

1. All nuts, bolts and washers to be stainless steel.

2. All brackets and supports to be galvanized steel.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which traffic signage is to be installed with materials and components specified in this Section. Affected Prime Contractors, Owner's Representative and Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 INSTALLATION

A. Erect traffic signs in locations designated on the Contract Documents and in accordance with the approved shop drawings and the applicable requirements of New York State Department of Transportation Standard Specification, Section 645.

B. Protect surfaces and finishes from abrasion and other damage during handling and installation.

C. Mount signs at the height shown on the drawings or as directed by the Architect. Align sign with the mounting post and angle properly for traffic flow. Tighten bolts and nuts properly and bend bolts where required to prevent vandalism.

3.03 ADJUSTING AND CLEANING

A. Repairs and Protection of Traffic Signage

1. Repair or replace broken or defective traffic signs as directed by the Architect.
2. Protect traffic signage from damage until acceptance of the installation work.

END OF SECTION 101453

SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Phenolic-core toilet compartments.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for blocking .
2. Section 092216 "Non-Structural Metal Framing" for blocking.
3. Section 102800 "Toilet, Bath, and Laundry Accessories" for accessories mounted on toilet compartments.

1.2 COORDINATION

A. Coordinate requirements for overhead supports, blocking, reinforcing, and other supports concealed within wall and ceiling to ensure that toilet compartments can be supported and installed as indicated.

1.3 ACTION SUBMITTALS

A. Product Data.

1. Phenolic-core toilet compartments.
   a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of toilet compartment.

1. Include Samples of hardware and accessories involving material and color selection.

D. Delegated Design Submittals: For grab bars mounted on toilet compartment panels, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For toilet compartments.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Hinges: One hinge(s) with associated fasteners.
2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
3. Door Bumper: One door bumper(s) with associated fasteners.
4. Door Pull: One door pull(s) with associated fasteners.
5. Fasteners: 10 fasteners of each size and type.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain phenolic-core toilet compartments from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Structural Performance: Where grab bars are mounted on toilet compartments, design panels to comply with the following requirements:

1. Panels are able to withstand a concentrated load on grab bar of at least 250 lbf applied at any direction and at any point, without deformation of panel.

C. Regulatory Requirements: Comply with applicable provisions in ICC A117.1 for toilet compartments designated as accessible.

2.3 PHENOLIC-CORE TOILET COMPARTMENTS

A. Toilet-Enclosure Style: Floor-and-ceiling anchored .

B. Urinal-Screen Style: Wall hung Floor anchored Overhead braced .

C. Door, Panel, and Pilaster Construction: Solid phenolic-core material with melamine facing on both sides fused to substrate during manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch- thick doors and pilasters and minimum 1/2-inch- thick panels. Provide with no-sightline system consisting of door and pilaster lapped edges on strike side of door and door and pilaster lapped edges on hinge side of door (unless continuous hinge is used).

D. Urinal-Screen Construction: Matching panel construction.

E. Pilaster Shoes: Formed from stainless steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.

F. Pilaster Sleeves (Caps): Formed from stainless steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.

G. Urinal-Screen Post: Manufacturer's standard post design of monolithic phenolic-core urinal screen cutout at bottom to form a post ; with shoe and sleeve (cap) matching that on the pilaster.

H. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design, stainless steel.

I. Phenolic Compartment Finish: One color in each room.

1. Through-Color Phenolic: Manufacturer's standard solid through-color.
   a. Color: As selected by Architect from manufacturer's full range .

2.4 HARDWARE AND ACCESSORIES

A. Door Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty institutional operating hardware and accessories.

1. Hinges: Manufacturer's minimum 0.062-inch- thick, stainless steel continuous, cam type that swings to a closed or partially open position , allowing emergency access by lifting door. Mount with through bolts.
2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast stainless steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at toilet enclosures designated as accessible. Mount with through bolts.
3. Coat Hook: Manufacturer's heavy-duty, combination cast stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast stainless steel bumper at outswinging doors. Mount with through bolts.
5. Door Pull: Manufacturer's heavy-duty, cast stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at toilet enclosures designated as accessible. Mount with through bolts.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.5 MATERIALS

A. Aluminum Castings: ASTM B26/B26M.

B. Aluminum Extrusions: ASTM B221.

C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

D. Stainless Steel Castings: ASTM A743/A743M.

2.6 FABRICATION

A. Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Floor-Anchored Units: Manufacturer's standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

D. Floor-and-Ceiling-Anchored Units: Manufacturer's standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

E. Urinal-Screen Posts: Manufacturer's standard corrosion-resistant anchoring assemblies at posts and walls, with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

F. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, inswinging doors for standard toilet enclosures and 36-inch- wide, outswinging doors with a minimum 32-inch- wide, clear opening for toilet enclosures designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:
   a. Pilasters and Panels or Screens: 1/2 inch.
   b. Panels or Screens and Walls: 1 inch.
2. Full-Height (Continuous) Brackets: Secure panels or screens to walls and to pilasters with full-height brackets.
   a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

D. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.

E. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware in accordance with hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.17

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Toilet-compartment occupancy-indicator system.
3. Hand dryers.
4. Underlavatory guards.
5. Custodial accessories.

B. Related Requirements:

1. Section 088300 "Mirrors" for frameless mirrors.

1.2 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Public-use washroom accessories.
2. Toilet-compartment occupancy-indicator system.
3. Hand dryers.
4. Underlavatory guards.
5. Custodial accessories.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

C. Samples: For each exposed product and for each finish specified, full size.

1. Approved full-size Samples will be returned and may be used in the Work.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain each type of public-use washroom accessory from single source from single manufacturer.

B. Combination Toilet Tissue Dispenser :

1. Mounting: Surface mounted Partition mounted, dual access with two tissue rolls per compartment and with one side that mounts flush with partition of accessible compartment.
2. Toilet Tissue Dispenser Capacity: 4-1/2- or 5-inch- diameter tissue rolls.
3. Toilet Tissue Dispenser Operation: Noncontrol delivery with theft-resistant spindles .
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) .
5. Lockset: Tumbler type.

C. Automatic Soap Dispenser :

1. Description: Automatic dispenser with infrared sensor to detect presence of hands; electrically operated, with adapter for 110- to 240-V ac power supply ; designed for dispensing soap in liquid or lotion form.
2. Mounting: Surface mounted.

D. Grab Bar :

1. Mounting: Flanges with concealed fasteners.
2. Material: Stainless steel, 0.05 inch thick.
   a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings .

E. Sanitary-Napkin Disposal Unit :

1. Mounting: Partition mounted, dual access Surface mounted.
2. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
3. Receptacle: Removable.
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) .

F. Mirror Unit :

1. Frame: Stainless steel angle, 0.05 inch thick .
   a. Corners: Manufacturer's standard .
2. Size: As indicated on Drawings .

G. Hook :

1. Description: Single-prong unit .
2. Mounting: Exposed.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) .

H. Fixed Height Adult Changing Station :

1. Description: Horizontal unit that opens by folding down from stored position and with adjustable strap.
   a. Engineered to support minimum of 400 lb static load when opened.
2. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed .
3. Operation: By pneumatic shock-absorbing mechanism.
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners .
5. Liner Dispenser: Provide built-in dispenser for disposable sanitary liners.

2.4 TOILET-COMPARTMENT OCCUPANCY-INDICATOR SYSTEM

A. Toilet-Compartment Occupancy-Indicator System :

1. Description: Battery-powered latch and electrically powered indicator-light system. Latches communicate wirelessly with separate, overhead indicator lights.
2. Latch: Slide operation.
   a. Compatibility: Provide latch compatible with compartment doors indicated for Project.
   b. Latch Material and Finish: Matte chrome-plated, die-cast zinc alloy (zamac); installed with stainless steel fasteners.

2.5 HAND DRYERS

A. Source Limitations: Obtain hand dryers from single source from single manufacturer.

B. High-Speed Air Dryer :

1. Description: High-speed, warm -air hand dryer for rapid hand drying.
2. Mounting: Surface mounted.
   a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.
3. Operation: Infrared-sensor activated with timed power cut-off switch.
   a. Average Dry Time: 12 seconds.

b. Automatic Shut Off: At 60 seconds.
4. Maximum Sound Level: [**69**] dB.
5. Cover Material and Finish: [**Chrome-plated steel**] Stainless steel, ASTM A480/A480M No. 4 finish (satin) .
6. Electrical Requirements: 115 V, 15 A, 1725 W .

2.6 UNDERLAVATORY GUARDS

A. Underlavatory Guard :

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.7 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain each type of custodial accessory from single source from single manufacturer.

2.8 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.9 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:
   a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.2 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site .

1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:
   a. Schedules and coordination requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
2. Show location of knockouts for hose valves.

B. Samples for Initial Selection: For each type of exposed finish required.

C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

2.3 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher .

B. Cabinet Construction: Nonrated .

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Aluminum sheet Stainless steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.

E. Cabinet Trim Material: Aluminum sheet Extruded-aluminum shapes Stainless steel sheet Same material and finish as door.

F. Door Material: Aluminum sheet Extruded-aluminum shapes Stainless steel sheet .

G. Door Style: Full acrylic bubble with frame .

H. Door Glazing: Acrylic sheet .

1. Acrylic Sheet Color:
   a. Clear transparent acrylic sheet painted red on unexposed side.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch .
2. Provide continuous hinge, of same material and finish as trim, , permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Break-Glass Door Handle: Manufacturer's standard, integral to glass with the words "PULL TO BREAK GLASS" applied to handle.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated .
   a. Identify fire extinguisher in fire-protection cabinet with the words " FIRE EXTINGUISHER ."
      1) Location: Applied to location indicated on Drawings.
      2) Application Process: Silk-screened .

3) Lettering Color: White.
4) Orientation: Vertical .

K. Materials:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.
   a. Finish: ASTM A480/A480M No. 4 directional satin finish, .
2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, .
3. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished) .

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at height indicated below:

1. Fire-Protection Cabinet Mounting Height: 42 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification:

1. Apply decals at locations indicated.
2. Apply decals on field-painted fire-protection cabinets after painting is complete.

3.3 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:
   a. Schedules and coordination requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
   b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
2. Valves: Nickel-plated, polished-brass body.
3. Handles and Levers: Stainless steel.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type : UL-rated 5 lb. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
   a. Orientation: Vertical .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor.

END OF SECTION 104416

SECTION 107500 - FLAGPOLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Ground Set Flagpoles
B. Accessories

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work

1.03 REFERENCES

A. ASTM B 241/B 241 M – Standard Specification for Aluminum and Aluminum Alloy Seamless Pipe and Seamless Extruded Tube

1.04 SYSTEM DESCRIPTION

A. Design Requirements

1. Flagpole Height: 35 feet.
2. Flag Size: 6 feet by 10 feet.

B. Performance Requirements: Provide flagpole and installation designed to withstand a minimum wind speed of 120 MPH without permanent deformation.

1.05 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Shop Drawings: Submit shop drawings for flagpoles, including scaled sections, dimensioned elevations, anchors, reinforcement, accessories and installation details.

D. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable requirements of this Specification.

E. Closeout Procedures: Comply with the requirements of Section 017700.

1.06 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.07 SEQUENCING AND SCHEDULING

A. Proceed with and complete flagpole installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

1.08 DELIVERY, STORAGE AND HANDLING

A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.

B. Protect flagpoles and accessories from damage or moisture.

1.09 WARRANTY

A. Furnish manufacturer's standard warranty against defects in product, workmanship and materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. For convenience, details and specifications have been based on flagpoles manufactured by Concord Industries, Inc., Addison, Texas (Tel. #1-800-527-3902).

2.02 CONCEALED HALYARD GROUND SET FLAGPOLE

A. Concealed halyard system flagpole similar to "Independence" by Concord Industries, Inc.

B. Shaft: Seamless cone tapered aluminum tubing conforming to ASTM B 241, Alloy 6063, Temper T6.

1. Finish: Polished to a deep luster sheen, clear anodized finish conforming to AA M32-C22-A41.

C. Truck: Cast aluminum housing and spindle, internal halyard type with 2½" diameter plated sheave; revolving mounting, non-fouling.

D. Halyard

1. Material: 1/8" diameter braided steel aircraft wire.
2. Hardware: Two chrome swivel type flag snaps each set spaced for the specified flag sizes, stainless steel quick links attached to halyard ends with connecting swivel and neoprene coated counter-weight with beaded nylon retainer ring.

E. Winch and Handle: Internal, direct drive, gearless type mounted on a rotating plate. The winch shall be constructed of stainless steel, locking in any position upon removal of the winch handle and include a single reinforced access opening and door with keylock with access hole in the door for the winch handle.

2.03 ACCESSORIES

A. Ground Sleeve: Galvanized steel components as indicated below:

a. Foundation Tube: Corrugated, 16 gauge tube with diameter and length as required for the specified flagpole height, centered on and welded to face of base plate.
b. Base Plate: Square with side dimensions of 4 inches greater than the inside dimension of the foundation tube.
c. Ground Spike: ¾" diameter, 18" long, centered on and welded to the face of the base plate opposite the foundation tube attachment.
d. Setting Plate: 6' square with a drilled hole at the center for attachment to the ground spike, welded perpendicular to the length of the ground spike, 6 inches from the base plate.

B. Shoebase Mounting Hardware

a. Anchor Base: Cast aluminum, heat treated, drilled for anchor bolt diameter and pattern specified in the manufacturer's descriptive literature for the specified flagpole height, sleeved over the shaft butt and joined to the shaft butt by continuous, circumferential welds at outside top and inside bottom of the base. The entire assembly, including the flagpole, shall be heat treated after the attachment of the shoebase casting.
b. Fasteners: Quantity, diameter and length specified in the manufacturer's descriptive literature for the specified flagpole height, including anchor bolts, nuts and washers.

C. Flash Collar: Manufacturer's standard spun aluminum flash collar with finish matching the shaft.

D. Finial: Spun aluminum, 14 gauge wall thickness, flush seam, gold anodized finish, diameter matching the butt diameter of the shaft.

E. Cleat Covers: Aluminum housing, finish matching the shaft, with keyed operated cylinder lock, keyed alike for multiple units; two keys supplied for each lock.

F. Halyard Boxes: Aluminum housing with finish matching the shaft, five feet in height.

2.04 CONCRETE MIXES

A. Concrete: 3000 psi compressive strength at 28 days, 6% air entrained.

B. Grout: 5000 psi, non-shrink grout at 28 days.

2.05 FABRICATION

A. Provide self-aligning internal sleeves for shafts fabricated in sections for field assembly; field welded connections including plug welding is not permitted.

B. Fabricate end to end joints of shaft sections for hairline joint after connection; match, mark and number shaft sections for field assembly.

2.06 TYPICAL POLE DIMENSIONS

A. Provide and install flagpoles with the following typical pole dimensions and specifications:

Exposed Height	Overall Height	Butt Diam.	Top Diam.	Wall Thickness	Tapered Length	Straight Length
35 ft.	38'-6"	7"	3.5"	0.188"	20 ft.	18-6

2.07 FLAG

A. Provide and turn over to the Owner a 5’ x 8’ size, two-ply sewn polyester flag with canvas header and two brass grommets designed for outdoor use.

1. Flag to meet or exceed to properties of Koralex II as manufactured by Valley Forge Flag Company, Inc, Moncks Corner, South Carolina.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which flagpoles are to be installed with the materials and components specified in this section. Affected Prime Contractors, the Owner’s Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

2. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 INSTALLATION

A. Install flagpole components and accessories in accordance with approved shop drawings and the Manufacturer’s installation instructions.

B. Ground Sleeve

a. Excavate in well compacted soil to the indicated depth, width and length, providing shoring for unstable soil conditions. Remove all non-soil materials from the excavation area.
b. Coat the surface of the ground sleeve assembly, and the surfaces of the shaft that will be installed below grade with bituminous paint, minimum 5 mil dry film thickness.
c. Place the ground sleeve assembly in excavation. Drive the ground spike into undisturbed soil to the extent that the base plate is flush with the bottom of the excavation.
d. Place concrete in the excavation immediately after mixing using a chute to deliver the concrete for proper placement. Surround the ground sleeve with concrete, placing the concrete to finish grade and compacting with vibrators.

e. Slope the concrete surface from the top of the ground sleeve to grade for water run-off, screed the concrete surface to a smooth trowel finish.
f. Moist cure the concrete surface allowing the concrete to attain its full 28 day compressive strength prior to installing the flagpole.

C. Shoe Base

a. Set the base in a grout bed of sufficient height that excess grout is displaced as anchoring and adjusting of the flagpole assembly progresses. Align the base hole pattern with anchor bolts and lower the base to the grout bed.
b. Anchor and align the flagpole plumb. Provide temporary bracing until the grout attains its full compressive strength.
c. Screed exposed grout surfaces to a 45-degree fillet removing excess grout from the substrate.

3.03 ADJUSTING AND CLEANING

A. Repairs and Protection of Flagpoles

1. Repair or replace broken or defective flagpole components as directed by the Architect.
2. Protect units from damage until acceptance of flagpole installation.

END OF SECTION 107500

SECTION 116833 - ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Football goal posts and accessories
B. Soccer goals and accessories
C. Soccer corner flags
D. Lacrosse goals
E. Field hockey goals and accessories
F. Ball Safety Netting
G. Steeplechase water jump pit, hurdle set and accessories
H. Long lump/triple jump take-off boards
I. Jump sand pit mesh covers
J. Pole vault box and cover
K. Shot put ring
L. Shot put toe board
M. Discus ring
N. Discus cage
O. Synthetic turf groomer

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork – Site Work
B. Section 321813 – Synthetic Grass Surfaces
C. Section 321823 – Running Track Surfacing

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with the applicable portions of this specification.

D. Closeout Procedures: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide products by a company specializing in the manufacture of athletic equipment with at least five years experience.

1.05 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.06 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Deliver all equipment in a manner to protect the material from dirt, water, chemical or mechanical injury.

B. Acceptance at the Project Site: Deliver all athletic equipment to the site to designated representatives of the Prime Contractor responsible for athletic field equipment for storage and handling when required. The Owner or other contractors on the project site shall not store or handle any athletic equipment.

1.07 SEQUENCING AND SCHEDULING

A. Proceed with and complete athletic field equipment installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. For convenience, details and specifications have been based on the following products by the following manufacturers:

1. Sportsfield Specialties, Inc; Delhi, New York (Telephone# 1-888-975-3343):

a. Football Goal Posts and Accessories

(1) "8' Offset High School Football Goal Post with Access Frame Insert Kit" – Model No. GP4380.
(2) "Post Protector Pads" – Model No. 4590R.

b. Soccer Goals

(1) "Round Faced Soccer Goal with Mobility Wheel Kit and Safety System" – Model Nos. SG4950, SG4955, SG Mobile and SG 2S (One complete set of two required).

c. Soccer Corner Flags

(1) "Premier Soccer Corner Flags" – Model #SG6B1404 (Set of four)

d. Lacrosse Goals

(1) "Heavy Duty Lacrosse Goal with Flat Iron Base" – Model No. LCG01 (One complete set of two required).

e. Field Hockey Goals and Accessories

(1) "Field Hockey Goal with Portable Mobility Wheel Kit with Integrated Retractable Handle" – Model Nos. FHG and FHGWK (One complete set of two required).

f. Track and Field Equipment

(1) "Steeplechase Water Jump Pit with Covers" – Model No. WJ5000.
(2) "Adjustable Steeplechase Hurdle" – Model No. WJ5010/5020.
(3) "Steeplechase Portable Hurdle Set" – Model No. WJSCH4STM (One complete set of four required).
(4) "Weighted Double Mesh Sand Pit Cover with Digital Graphics" – Model No. SPCVRMD (Two mesh covers required)

2. Aluminum Athletic Equipment Co., Royersford, Pennsylvania (Telephone #1-800-523-5471):

a. Track and Field Equipment

(1) "Stainless Steel Vault Box and Cover" – Model Nos. SSVB and SSVC (Two sets required).
(2) "2 Inch Aluminum Shot Put Circle" –Model No. SC-2 (One required).
(3) "Depressed Pad Aluminum Shot Put Toe Board" – Model No.ATBC (One required).
(4) "2 Inch Aluminum Discus Throwing Circle" – Model No. DC-2 (One required).
(5) "Official High School Discus Cage" – Model No. HSDC and "Back-Up Net" – Model No. BN-HSDC (One required).
(6) "8 Inch Take-Off Board System" – Model No. CTB-8 (Four required).
(7) "Ballstopper System with Ground Sleeves" – Model No. HBS-1

3. GreensGroomer WorldWide, Indianapolis, Indiana (Telephone #1-888-298-8852):

   a. Synthetic turf grooming equipment:

      (1) "Synthetic Sports Turf Groomer" – Model #920SDE.
      (2) "Spring Tine Rake" – Model #STR.
      (3) "Litterkat" – Model #760

2.02 MATERIALS

A. Football Goal Posts and Accessories

1. 8' Offset High School Football Goal Post: Minimum 30' high, permanently installed, white powder coated goal post system with access frame kit, protective pads and other accessories complying with the following:

   a. Gooseneck Supporting Post: Minimum 6 5/8" O.D. schedule 40 aluminum pipe bent to provide a minimum eight-foot offset to the crossbar including two 10.75" rods to assist in leveling the unit. Gusset reinforcing plates are not acceptable.
   b. Cross Bar: Minimum 6 5/8" O.D. schedule 40 aluminum pipe set 10' above finish ground elevation with crossbar length as required to comply with the National Federation of State High School Associations rules and regulations.
   c. Uprights: Two minimum, 20' long, 4" O.D., 6061 T6 aluminum tube. Each upright to be equipped with a wire loop at the upper end and 4" X 48" red nylon, directional wind flags.
   d. Ground Sleeve: Five foot long, 8", hot dipped galvanized, schedule 40 steel pipe.
   e. Concrete: 3000 lb. mix for footing installation.
   f. Access Kit: 22¼" square by 6" high aluminum access frame with eight anchor bolts and filler plugs fabricated of pressure treated plywood and artificial turf.
   g. Goal Post Pads: Minimum 6" thick, split cylindrical foam core, 6'-0" high fully encapsulated in vinyl laminated polyester fabric with a minimum weight of 16 ounces per square yard. Units to include full length hook and closure strip and two tie cords (top and bottom) per pad. Pad color to be red. Pads to be lettered to indicate "RED RAIDERS".
   h. Goal Connection Hardware: Lock down device fabricated to securely anchor soccer goal assemblies to the football goal post to prevent overturning of soccer goal units.

B. Soccer Goals and Accessories

1. Round Faced Soccer Goal with Mobility Wheel Kit and Safety System: Steel and aluminum framed soccer goals with nylon nets and related accessories complying with the following:

   a. Crossbar: White powder coated, 24' long, round face, 4.375" square X 4.688" 6061 T6 extruded aluminum tube with radius backside corners and 7-gauge steel crossbar attachment brackets.
   b. End Frame: White powder coated, round face with radius back corners, 4.375" X 4.688" corner upright posts fabricated of 6061 T6 extruded aluminum tube with 2" X 3" X 0.125" rolled side frame welded to corner upright posts.
   c. Bottom Ground Bar: White powder coated, 2" square X 0.250" thick 6061 T6 extruded aluminum tube.
   d. Net Clips: Welded aluminum.
   e. Net: Orange polypropylene.
   f. Portable Wheel Mobility Kit: Wheel insert with welded 13-gauge stainless steel frame, UHMW plastic wheel, all stainless-steel hardware and mobility handle.
   g. Safety Clamp Kit: 0.25", white powder coated aluminum safety clamp with stainless steel hardware and access kit fabricated of 16 gauge, 0.125" aluminum stainless steel with 0.25" and 0.75" weather resistant plywood cover plug, stainless steel assembly hardware and galvanized steel anchoring hardware.

2. Soccer Corner Flags: Set of four, weighted soccer corner flags for synthetic turf field use meeting NFSHSA, NCAA and FIFA standards and complying with the following:

   a. Size: 63" high.
   b. Uprights: White, high impact PVC, minimum 1.00" O.D.
   c. Base: Round, black, 12" diameter stackable base standing 5.094" high and weighing 8.50 pounds per flag unit.

d. Flag Color: Red.

C. Lacrosse Goal and Accessories

1. Heavy duty lacrosse goal with flat iron base and net complying with the following:

a. Frame: Orange powder coated uprights and top bar fabricated from TIG welded 1.50" Schedule 40 steel pipe.
b. Ground Bar: Orange powder coated TIG welded steel bar.
c. Assembly Hardware: Stainless steel.
d. Net: Heavy duty, minimum 5mm, white, braided, knotless polyester similar to netting manufactured by STX.

D. Field Hockey Goal and Accessories

1. Heavy duty field hockey goal with net and wheels complying with the following:

a. Size: 7' high X 12' wide X 4' deep.
b. Frame: One piece side frame construction fabricated from TIG welded square, 2" X 2" X 0.090" thick wall aluminum tubing.
c. Net Clips: Welded aluminum.
d. Finish: White powder coated.
e. Bottom Boards: ½" thick black polyethylene secured by bottom and top channels.
f. Net: 7' high X 12' wide X 4' deep, 1½" square mesh fabricated from 2.5 mm twisted black polyethylene material.
g. Assembly Hardware: Stainless Steel.
h. Wheels: Portable mobility wheel kit option with integrated retractable handle required.

E. Steeplechase Water Jump Pit with Covers, Adjustable Hurdle and Accessories: Steeplechase water jump system complying with the following:

1. Water Jump Pit: Interior 12' X 12' dimension, 0.125" thick aluminum with the following attributes:
2. Gusset reinforced, double wall, side and rear panels with 22.4% tapered side wall slope, slip joint bolt together construction and built-in screed edge guide for synthetic track surfacing materials.
3. Built in 3" schedule 40 drain valve at the center of the front wall with serviceable sealed plate at the bottom of the front wall and valve extension handle included and stored in the in the front wall.
4. Continuous waterstop at the floor/side wall joint.
5. Aluminum barrier sleeves.
6. Cover ledge at the entire perimeter of the pit sized to accept cover panels.
7. Pit Cover Assembly: Self supporting beam style sections with recessed handles and ½" recessed top surface for synthetic track surfacing material installation.
8. Cover Ledge Filler Assembly: 6" deep X 12' long X 2" wide aluminum.
9. Hurdle with Barrier: Aluminum 5" X 5" synthetic track material covered steeplechase hurdle adjustable to both men's and women's competition heights with aluminum barrier seal and hurdle sleeve cover plates.
10. Portable Hurdles (Set of Four): One 16'-6" hurdle and three 13'-6" hurdles fabricated of the following:

a. Ground Bars: 4" square aluminum tubing with ¼" end plates.
b. Adjustable Legs: 4" square aluminum tubing and 3" Schedule 40 pipe with ¼" mount plates.
c. Beams: 4" square aluminum tube wrapped with synthetic track surface.
d. Finish: Aluminum powder coated white with beams painted white and black.
e. Hardware: Stainless steel.
f. Mobility Accessory: Hurdle wheel device.

11. 4000 lb. concrete mix for footing installation.

F. Long Jump/Triple Jump Takeoff Board System: Heavy gauge 304, 8" wide stainless steel tray with aluminum insert containing a double surface support and ½" white polyethylene Densilite board measuring 2.3125" by 8" by 4'-0'. The track surfacing contractor shall install a ½" layer of resilient track surfacing on to the unit as recommended by the Manufacturer.

G. Long Jump/Triple Jump Weighted Double Mesh Sand Pit Covers: System complying with the following:

1. Dimensions: Custom 12'-0" wide by 32'-0" length.

2. Mesh Construction: Double layer, heavy duty vinyl coated mesh, color to be chosen by the Architect from the Manufacturer's standard available finishes.
3. Perimeter Ballast: Quarter inch galvanized chain within heat welded, 19-ounce heavy coated vinyl pocket, Vinyl finish to be chosen by the Architect from the Manufacturer's standard available colors.

H. Pole Vault Box and Cover: Stainless steel unit with lifetime guarantee complying with the following:

1. Vault box complying with NCAA and NFSHSA regulations constructed of 13-gauge stainless steel with welded stainless steel anchor lugs and slots to accept cover hinges.
2. Hinged stainless steel vault box cover with 1" diameter finger hole grommet.
3. 3000 lb. concrete mix for system component installation.

I. Shot Put Throwing Circle: Pre-formed, ¼" X 2" X 2" aluminum angle bent to a standard 7'-0" diameter circle area complying with NCAA and NFSHSA standards. Surrounding pad to be constructed of 3000 lb. concrete mix.

J. Shot Put Toe Board: 3¼" high X 4½" wide X 0.250" wall thickness cast aluminum toe board for depressed installations with 4'-0" throwing sector and stainless-steel hardware.

K. Discus Throwing Circle: Pre-formed, ¼" X 2" X 2" aluminum angle bent to a standard 8'-2½" diameter circle area complying with NCAA and NFSHSA standards. Surrounding pad to be constructed of 3000 lb. concrete mix.

L. High School Discus Cage and Backup Net: Curved 4" structural aluminum posts, weather treated nylon safety nets and associated accessories complying with the following:

1. Uprights: Six 4.00" O.D. X 0.125" X 17'-6", 6061-T6 aluminum tube with 2'-0" arc offset.
2. Main Net: 14'-0" high X 54'-0" long, #240 black nylon, 1¾" square net, B-treated.
3. Ground Sleeve: Six 4.35" O.D. X 0.100" X 2'-6", 6061-T6 aluminum tube with plastic caps.
4. Pulley: #18-1 deck block galvanized steel pulley.
5. Pulley Bolt: ¼"-20 X4 ½" plated flat head machine screw.
6. Cleat: 6" galvanized steel.
7. Cleat Bolt: ¼"-20 X 5½" plated, flat head machine screw.
8. Stop Bolt: ½"-13 X 5" plated steel.
9. Stop Bolt Nut: ½" – 13 plated steel.
10. Hoisting Rope: 21' long, #10 polypropylene white braided rope with snap.
11. Swivel Snap: Plated, ½" eye, 3/8" snap, 3¼" long.
12. Rivet Nut: Aluminum 5/16"-18 KLIK rivet nut.
13. Barrier Net Eyebolt: 5/16"-18 X 2" plated eyebolt.
14. Barrier Net: 7'-0" high X 61'-0" long, #240 black nylon, 1 ¾" square net, B-treated.
15. Hook Snap: ¼" diameter, 5/16" plated snaps for both main and barrier nets.
16. Eye Bolt: Plated steel, 3/8"-16 X 2½" long.
17. Concrete Anchor: 3/8"-16 tampin insert, P25T.
18. Swivel Pulley: #3-5 fast eye, galvanized steel.
19. 3000lb. concrete mix for system component installation.

M. Ball Safety Netting: System complying with the following:

1. Ground sleeve system with the following components:

a. 2-3/8" O.D. X 0.1875" X 12'-6" mill finished 6061-T6 aluminum uprights with black polyethylene caps.
b. 2 ½" X 24" 6061-T6 aluminum sleeve, green polyethylene installation plug with tab and one manufacturer supplied "Removal Tool".
c. 3000 lb. concrete mix for footing installation.
d. Hardware including stainless steel bolts, eye bolts nuts and hog ties, solid brass spring loaded snaps, ¼" galvanized cable clamp and 3/16" clear coat, galvanized cable.
e. 9'-0" high, 1¾" square, black knotted nylon netting with a ¼" rope border.

N. Synthetic Turf Groomer: Turf maintenance equipment capable of standing up synthetic infilled fibers in one pass complying with the following:

1. Main Frame: 2", 11-gauge square tube with 1½", 10-gauge square tube cross bars.
2. Draw Bar: One piece, 2" square tube.

3. Length: 48” (84” total overall including draw bar).
4. Width: 72”.
5. Weight: 260 pounds.
6. Running Gear: Two pneumatic tires (16 X 650-8), ribbed two-ply with oil impregnated bushings.
7. Electric Lift: 1000-pound capacity electric 12-volt linear actuator.
8. Finish: Powder coated six-step pre-wash including degreaser and anti-rusting coating.
9. Brushes: Sixteen super duty synthetic brushes with flat bristles attached to a polypropylene head.
10. Brush Weight: 26 pounds.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which athletic field equipment is to be installed with the materials and components specified in this section. Affected Prime Contractors, the Owner’s Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure the requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 INSTALLATION

A. Install athletic equipment in accordance with the manufacturer’s written instructions under the supervision of a manufacturer’s representative.

3.03 ADJUSTING AND CLEANING

A. Repairs and Protection of Athletic Field Equipment

1. Repair or replace broken or defective components athletic field equipment components as directed by the Architect.
2. Protect athletic field equipment from damage until acceptance of the installation.

END OF SECTION 116833

SECTION 116843 - EXTERIOR SCOREBOARDS

A. GENERAL

1.2 SECTION INCLUDES

A. Football play clocks with associated control consoles.

1.3 REFERENCES

A. Standard for Electric Signs, UL-48, 13th Edition

B. Standard for Control Centers for Changing Message Type Signs, UL-1433, 1st Edition

C. Standard for Can/CSA C22.2

D. Federal Communications Commission Regulation, Part 15

E. National Electric Code

1.4 RELATED SECTIONS

A. Section 020500 – Reports On Exploration

B. Section 311001 – Earthwork–Site Work

C. Division 26 – Electrical Specifications

1.5 SUBMITTALS

A. Comply with the requirements of Division 01 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for the following components demonstrating compliance with the specified requirements:

1. Wireless scoreboards.
2. Control consoles.
3. All wiring diagrams, mounting details and installation manuals.
4. Maintenance data.
5. Renderings of all specified components including proposed graphics.

C. Structural Design Submittals: Provide design and detailing of scoreboard mounting structure and foundation by a professional engineer licensed in the state where the project is located. The professional engineer signing and sealing the submittal shall be responsible for the structural integrity of the mounting structure and foundation specified as part of this Section. Comply will all applicable provisions of the local building code and the Fire Prevention Code. Calculations shall include but are not limited to the following:

1. Description of design criteria.
2. Structural analysis of stress and deflection requirements for each framing application.
3. Selection of framing components and accessories.
4. Design and verification of connections.

D. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements specified below in the "Quality Assurance" section of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable requirements specified in the "Quality Assurance" section of this specification.

E. Closeout Procedures: Comply with the requirements of Division 01.

1.6 QUALITY ASSURANCE

A. All components including the scoreboard, control console and other accessories and installation hardware shall be the products of a single manufacturer.

B. The company providing the scoreboard shall specialize in the manufacturing of exterior, electronic, athletic scoreboards with a minimum of ten years of experience.

C. The scoreboard and other electrical components shall be certified for use in the United States and shall have an Underwriters Laboratories (UL) label securely attached. The scoreboard shall be listed UL Standards 48 and 1433.

D. The scoreboard and electrical components shall be designed and manufactured in accordance with the National Electric Code.

E. The scoreboard and other electrical components shall be electrically grounded in accordance with the National Electric Code, Article 600.

F. The scoreboard shall be compliant with the Code of Federal Regulations 47CFR15 – Federal Communications Commission Regulation Part 15, "Radio Frequency Devices".

G. The scoreboard shall be specifically manufactured for outdoor use.

H. Existing displays of all scoreboards specified must be currently installed in a location in the United States within 100 miles of the Village of Nyack and be accessible for demonstration to the School District prior to submittal approval.

I. Display equipment components must be procured from a single manufacturer.

1.7 STRUCTURAL REQUIREMENTS

A. Design Wind Speed: Comply with the applicable requirements of the building code of the State of New York including applicable portions of ASCE 7 for Wind Load Pressure.

B. Seismic Design: Comply with the applicable requirements of the Building Code of the State of New York and in accordance with the current edition of the AISC Seismic Design Manual.

C. Structural Design: The Contractor must have the footing and columns for the scoreboard indicated on the Drawings certified by a Professional Engineer in the State of New York prior to the fabrication and erection of the scoreboard system.

1.8 DELIVERY, STORAGE AND HANDLING

A. The scoreboard and associated equipment shall be delivered to the project site and be housed in a clean, dry environment prior to installation.

1.9 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

B. Environmental Limitations: Do not install any scoreboard equipment until the mounting structure is secure and concrete foundations have had ample time to cure.

C. Mounting Structure: Verify that the mounting structure is capable of supporting the scoreboard's weight and wind load in addition to any auxiliary equipment and accessories.

D. Weather Conditions: Installation of the scoreboard may proceed only within acceptable weather conditions.

1.10 SEQUENCING AND SCHEDULING

A. Proceed with and complete scoreboard installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

1.11 MAINTENANCE

A. Completely service the sports field scoring systems specified within this section for a minimum of one year after final acceptance.

1.12 WARRANTY/SERVICE PLAN

A. Scoring equipment and all components shall be warranted free from defects in materials and workmanship for a minimum period of five years after final acceptance. The warranty shall include but is not limited to typical scoreboard maintenance including wired controls, wireless controls, receivers, LED modules, internal controllers, internal power supply and all accessories.

B. The warranty shall cover all parts and labor within the written five-year period with exchange of parts available within 24 hours notice.

C. A copy of the actual warranty must be provided with the initial scoreboard approval submittal package.

D. Provide an exchange program to supply replacement parts for components that fail during the coverage period. To minimize downtime, the exchange parts shall be shipped on the same day the order is received or on the following day.

E. The Manufacturer shall provide contact information and access to a local authorized service representative.

F. The Manufacturer shall provide a help desk staffed by experienced technicians and coordinators who are thoroughly familiar with the installed equipment and available for technical support. The staff shall be available at no additional cost to the customer and provide, if needed, an "on-call" service during weekends.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. For convenience, details and specifications have been based on scoreboard systems manufactured by Watchfire Signs, Danville, Indiana (1-800-637-2645) or approved equal to establish quality and function.

1. Exhibition Field Play Clocks – Model #WF-AC-1125T-R2 (One pair required).

B. Refer to the Instructions to Bidders, General Conditions, Supplementary Conditions and Division 1 of the Project Manual for additional provisions and requirements relating to equivalent products or substitutions.

2.2 PLAY CLOCKS

A. Product Overview: LED timer capable of counting down from any preset number or counting up to 99. It shall have stand alone timer capability along with the ability to be used as a timing display for a complete scoring system. The play clock shall include wireless operation from a wireless control station that is provided with the unit.

B. General Information

1. Dimensions: 3'–0" high by 3'-0" wide by 6" deep constructed of .050" aluminum.
2. Electronic Technology: Solid-state.
3. Weight: 90 pounds.
4. Ventilation Style: Rear ventilation.
5. Power requirement: 270 watts maximum, 120 VAC, 60 Hz.
6. Color: To be chosen by the Architect from the Manufacturer's 30 standard colors.

C. Digits

1. Bar Segments: Seven per digit
2. Clock Digit Size: 24" high
3. LED Digit Color: Amber or red
4. Display Digits: 2" X 2" circuit card mounted pixels that are individually replaceable and containing four LED's each.
5. Pixels: Interchangeable throughout the play clocks rated for a minimum of 100,000 hours of use. Each pixel shall be con-formal coated front and back to protect the electronics from outside elements and individually serviceable from the front of the play clock cabinet.
6. Pixels Per Digit: 27 pixels(Four LED's per pixel).
7. LED Digit Brightness: 40,000 MCD (millicandela).

D. Scoring Console

1. Model: MSX Wireless (Two displays with cases)
2. Hand Switches/Controllers: Auxiliary

E. Wireless Remote Operation: Provide the following for operation of the scoreboard:

1. A radio transmitter at the console and a radio receiver mounted at the play clocks shall be provided and installed. The system shall comply with Part 15 of FCC Rules.

2. Reliable operating range shall exist between 6 feet and 1,000 feet.

F. Case shall be provided.

2.3 CONCRETE FOR FOOTINGS

A. Reinforced concrete for sports field scoring system footings shall have a compressive strength of 2500 PSI and shall be air-entrained.

2.4 STRUCTURAL STEEL

A. I-beam size as indicated on the Construction Documents.

B. Structural steel to be primed and painted black to match overhead arch truss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which scoreboards and associated accessories are to be installed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. Verify that the mounting structure is ready to receive the play clocks.
2. Verify that placement of conduit and junction boxes are as specified and are as indicated on the Contract Documents and on the approved shop drawings.
3. Verify that concrete has cured properly according to the Specifications.
4. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.2 CONCRETE FOOTING INSTALLATION

A. The installation of reinforced concrete footings for the sports field scoring systems shall meet the requirements of this Specification Section.

B. Provide for dewatering from surface water and ground water seepage into excavations and drilled shafts. Refer to the soil borings included in the Project Manual for information pertaining to the recorded elevation of the ground water table at the time the geotechnical investigation was performed.

C. All piers shall be exactly centered under columns and shall bear on undisturbed soil.

D. All concrete shall be mechanically vibrated.

3.3 POWER WIRING INSTALLATION

A. Power wiring shall be installed to the sports field scoring systems.

B. All power to scoreboards and displays shall be routed in conduit.

3.4 STRUCTURAL STEEL COLUMN INSTALLATION

A. Verify that all concrete footings have cured adequately.

B. Structural steel design, fabrication and erection shall conform to the AISC – Steel construction Manual, current edition.

C. All structural steel shall be covered with light gauge end caps.

D. All welding shall be performed by a certified welder with experience and certification in the type of welding required. Unless otherwise noted, all welds shall be fillet welds.

E. Any horizontal stringers required for installation shall be fabricated from steel capable of friction clamp design.

3.5 DEMONSTRATION AND TRAINING

A. The Scoreboard Manufacturer shall provide a demonstration and training session with the Owner and the Owner's Representative covering the complete operation and maintenance of the specified sports field scoring component and all related accessories.

B. Provide 10 spare LED units to the Owner and instructions for replacement.

3.6 ADJUSTING AND CLEANING

A. Repairs and Protection of Play Clocks and Associated Accessories

1. Repair or replace broken or defective equipment as directed by the Architect.
2. Protect systems from damage until Substantial Completion.

END OF SECTION 116843

SECTION 133416 - PERMANENT GRANDSTAND BLEACHERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Design, fabrication, and installation of aluminum, elevated, closed deck bleacher system including engineering, freight, foundations, installation and supervision to provide a new permanent grandstand structure.

1.02 RELATED SECTIONS

A. Section 014533 – Special Inspections and Procedures
B. Section 020500 – Reports On Exploration
C. Section 311001 – Earthwork–Site Work
D. Section 321216 – Asphalt Paving
E. Section 321313 – Concrete Paving
F. Section 323113 – Chain Link Fences and Gates

1.03 SYSTEM DESCRIPTION

A. Design Requirements: Closed deck grandstand bleacher with closed deck stair treads.

1. Comply with the applicable requirements of the IBC, the Building Code of the State of New York, and the ICC 300 Bleachers, Folding and Telescopic Seating, and Grandstands.
2. Capacity: Provide bleacher system with overall dimensions as shown on the drawings.
3. Footings: Minimum 4’-0” below finished grade and designed to provide sufficient bearing area and strength to support design live and dead loads as specified below. The foundation design provided is a preliminary design. Final design of the foundation system is delegated to a registered professional engineer retained by the grandstand bleacher manufacturer in accordance with sections 1808 and 1810 of the NYS Building Code.

B. Structural Requirements

1. Dead Load: No less than 6 psf for seatboards, footboards, risers and steel framing.
2. Uniformly Distributed Live Load: Not less than 100 psf to structural members, all stringers and girders shall be limited to L/200 for maximum vertical live load deflection and 120 plf for seat and foot boards.
3. Design Wind Speed: Comply with applicable requirements of the building code within the State of New York including applicable portions of ASCE 7 for Wind Load Pressure.
4. Sway: Not less than 24 plf parallel to the seat run and 10 plf perpendicular to the seat.
5. Deflection: Structural elements shall be sized to limit the live load deflections to 1/200 of the span.

C. Guardrails

1. Horizontal Load: 200 lbs. plf.
2. Vertical Load: 200 lbs. plf.

D. Seismic: Comply with the applicable requirements of the Building Code of the State of New York. Calculations and design to be based on the local governing building code.

E. Miscellaneous Requirements: Provide system with the following applicable requirements:

1. Railings: NFPA-101
2. Handicapped Access and Seating: Provide adequate spaces to comply with current ADA standards.
3. Steel Design and Fabrication: Design in accordance with the American Institute of Steel Construction (AISC), AA-94 and AISC Manual of Steel Construction, Load and Resistance Factor Design, 2nd Edition.
4. Welding: Perform work in accordance with American Welding Society (AWS) standards and AWS D1.2.
5. Aluminum: Perform work in accordance with Aluminum Association of America.
6. Footings: Perform work in accordance with the ACI Building Code for Reinforced Concrete.
7. Life Safety: NFPA-101 and NFPA-102.

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Shop Drawings: Submit shop drawings showing layouts of grandstand bleacher units coordinated with field measurements sealed by a NYS registered professional engineer and including the following minimum information:

1. Seat heights.
2. Row spacing and rise.
3. Aisle widths and locations.
4. Overall dimensions, connections and relationship to adjoining accessories and construction.
5. Types of materials and finishes.
6. Submit foundation design plans and details indicating design loads and pier size sealed by a NYS registered professional engineer.

D. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements specified below in the "Quality Assurance" section of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable requirements specified in the "Quality Assurance" section of this Specification.

E. Contract Closeout Submittals: Comply with the requirements of Section 017700.

1.05 QUALITY ASSURANCE

A. Experience: A company specializing in grandstand bleacher construction with a minimum of ten years of experience in the fabrication of bleacher systems. The Installer of the structure shall be the manufacturer of the bleachers or a certified manufacturer's subcontractor.

B. Fabricator: Comply with applicable provisions of AISC's "Code of Standard Practices for Steel Buildings and Bridges".

C. Warranty: Upon substantial completion of the project, the grandstand bleacher system shall be guaranteed for the following minimum periods:

1. Structure: Five years against structural defects including labor for repair.
2. Finish: Three years against finish including labor for repair.

D. Engineer Qualifications: The design of the grandstand bleacher system shall be reviewed and sealed by a licensed professional engineer in the State of New York prior to the Prime Contractor's submittal of the grandstand bleacher package for the Architect's review.

E. Regulatory Requirements: Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.06 PROJECT CONDITIONS

A. Contractor shall locate and mark all underground utilities and obstructions.
B. Contractor shall coordinate location, layout, elevations, and benchmarks with grandstand installer.
C. Owner shall provide Geotechnical Report indicating soil conditions.

1.07 SEQUENCING AND SCHEDULING

A. Proceed with and complete grandstand bleacher construction as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. For convenience, details and specifications have been based on grandstand bleacher systems manufactured by Sturdisteel Company, Waco, Texas (1-800-433-3116) or approved equal to establish quality and function.

B. Refer to the Instructions to Bidders, General Conditions, Supplementary Conditions and Division 1 of the Project Manual for additional provisions and requirements relating to equivalent products or substitutions.

2.02 MATERIALS

A. Structural Steel

1. All detailing, fabrication and erection shall be in accordance with AISC Specifications, Load and Resistance Factor Design, 2nd Edition.
2. Structural steel shall comply with ASTM A572 multi-certified grade 50 and miscellaneous steel shall comply with ASTM A36.
3. All bolts 5/8" diameter and larger shall comply with ASTM A325 and all bolts ½" and smaller shall comply with ASTM A307. Threaded rod shall comply with ASTM A36.
4. All welds shall conform to ANSI/AWS D1.1, latest edition. Electrodes shall be E70XX.
5. Columns shall be wide flange shapes.
6. Support beams shall be wide flange shapes.
7. Stringers shall be wide flange shapes.
8. Structural steel shall have a galvanized finish and all ferrous metal components shall be blast cleaned to an SSPC-6 white blast clean.

B. Guardrail

1. Guardrail is to be black powder coated aluminum picket rails installed on all sides of the grandstand and entry stairs.
2. All guardrails shall be secured to the galvanized steel structural angle posts/vertical members which are attached to the understructure. Attachment of the guardrail posts to the aluminum planking is prohibited. All railing shall be not less than 42 inches high measured vertically above the leading edge of the tread, adjacent walking surface or adjacent seat.

C. Handrail: Two-line center aisle handrails fabricated of anodized extruded aluminum pipe of 6061-T6 alloy with 1-15/16" outside diameter and 0.145" wall thickness. Handrails on all ramps and stairs shall provide a 1½" clearance from the guardrail material and shall extend a minimum of one foot past the last riser of the return. Newell post shall not interrupt handrails and the handrails shall not project more than 4.5" into the width of a stair or ramp.

D. Standard Seating

1. Finish: Seatboards shall be brushed and anodized aluminum.
2. Material: Seatboards shall be fabricated of 2" X 10" X 0.080", 6063-T6 extruded aluminum with a fluted surface and a minimum of four vertical legs weighing 1.9 pounds per foot with a 1" radius comfort curve front edge.
3. Mounting Brackets: 3/16" thick, A36 steel plate, plasma cut, bent and galvanized.
4. Connections: Seatboards shall be attached to the bleacher system by riser mounted galvanized steel "L" brackets. Deck mounted brackets are not acceptable. Seatboards must align with intermediate steps at the aisles.

E. Decking System: Decking is to be a closed deck utilizing an Interlocking No Through Bolt Decking System. The aluminum extrusions shall interlock together lengthwise while allowing for expansion and contraction of individual planks. The interlocking design will minimize the deflection of individual planks and cause the deck planks to react together at all treads and walkways. This decking system shall be such that the attachment of seat brackets, step brackets, mid-aisle rails and all other components is accomplished without any deck penetrations. This system also allows for seats and aisle reconfiguration at any time without evidence of the previous configuration. No drilling of the aluminum deck will be permitted. A tongue and groove typed decking or welded deck do not meet this specification.

F. Walking Surface Requirements

1. All aluminum footboards shall have an enhanced stain and slip resistant finish at all locations intended for use as walking surfaces including but not limited to walkways, aisles, walking surfaces in seating sections, stairs, ramps, platforms, handicapped areas and landings to minimize the effects of wet conditions for pedestrian safety.
2. The stain resistant finish shall be produced by the bleacher manufacturer in addition to the aluminum footboard mill extrusion process to prevent oxidation staining. Oxidation staining prior to the warranty completion shall be grounds for the replacement of affected aluminum footboards at the manufacturer's expense.
3. The slip resistant surface finish shall exhibit enhanced slip resistance beyond the mill extrusion process resulting in an improved coefficient of friction under wet conditions in all directions of travel. Standard, mill finish aluminum with raised extruded flutes does not fully comply with the slip resistant requirement for grandstand bleacher walking surfaces.

G. Stairs: 2 X 12 aluminum planking with contrasting nosings with a maximum of 7 inch rise and a minimum 11 inch tread.

H. End Caps

1. Walkway, footboard and aisle board end caps shall be one piece mill finish aluminum angle design tumbled after fabrication to remove burrs and sharp edges. End caps shall be secured to planks with rivets.
2. Seatboard end caps shall be one piece, friction fit extruded aluminum.
3. Guardrail posts shall be covered with cast aluminum top caps.

I. Handicapped Areas: Ramp, wheelchair areas and companion seating shall be installed as indicated on the drawings and in accordance with applicable codes and ADA requirements. Wheelchair spaces and companion seating shall be equally dispersed along the top walkway.

J. Riser Boards: Powder coated aluminum. Color to be chosen by owner.

K. Skirting and Enclosure Panels: Vertical closure shall fully enclose bleacher components from the walking surface to a maximum 2" above finished grade with 26 ga. Metal "R" panels to match the press box. Skirting shall be installed at the following locations:

1. Front of grandstand.
2. Egress stairs and associated platforms at the front walkway.

L. Reinforced Concrete

1. All concrete work and materials shall be in accordance with ACI 318.
2. Cast in place concrete shall have a minimum compressive strength of 4000 psi at 28 days.
3. All exterior concrete shall be air entrained to 6% +/- 1%.
4. Reinforcing steel shall be in accordance with ASTM A615, Grade 60.
5. Embedment of reinforcing in concrete shall be 3" if directly placed on earth, 2" if concrete is poured against forms and exposed to weather and 1½" with columns to ties, unless otherwise specified on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which the elevated grandstand bleacher system is to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 INSTALLATION

A. Install bleacher units in accordance with the Manufacturer's instructions and final shop drawings. Provide accessories indicated, anchors, inserts and other items required for installation of the units and attachments to adjoining construction.

3.03 ADJUSTING AND CLEANING

A. Repairs and Protection of Elevated Grandstand Bleachers

1. Clean installed grandstand bleacher unit on exposed and semi-exposed surfaces. Touch-up shop applied finishes to restore damaged or soiled areas.
2. Repair or replace broken or defective bleacher components as directed by the Architect.
3. Protect system from damage until Substantial Completion.
4. Remove and properly dispose of all packaging and construction debris.

END OF SECTION 133426

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SECTION 220500

COMMON WORK RESULTS FOR PLUMBING

1.01 SCOPE AND INTERPRETATION

A. These Specifications and accompanying Drawings provide for the furnishing, setting and connection of the installation of drainage and water supply systems.

B. The specifications and Drawings require the Contractor to provide all labor, materials, equipment and appliances to perform of all Work pertaining or incidental thereto, which is needed to complete the Work shown on the Drawings and called for in the Specifications.

C. The complete systems and the Work shall be so installed as to give proper and continuous service under all conditions, and shall be in accordance with the requirements of all public authorities having jurisdiction and to the complete satisfaction of the Owner. Any Work shown on the Drawings and not particularly described in the specifications, or vice versa or any Work which may be deemed necessary to complete the Contract shall be provided by the Contractor as part of its Contract.

D. For purposes of clearness and legibility, plumbing Drawings are essentially diagrammatic and size and location of equipment are drawn to scale wherever possible. The Drawings indicate size, connection points and routes of pipe. It is not intended, however, that all offsets, rises and drops are shown. Provide piping as required to fit structure, avoid obstruction, and retain clearances, headroom openings and passageways.

E. Fixtures shown and described on the Drawings shall be connected with waste, vent and water supply piping in accordance with the requirements of New York State Building Code, despite the omission of indication of such piping on the plans. Any question involving the installation of such piping shall be referred to the Engineer for resolution.

F. Scope of Work: The plumbing and drainage work of this contract shall include but shall not be limited to the following systems, equipment and services:

1. Equipment furnished under other Sections of this Contract: Including fire protection equipment shall be piped.

2. Piping, Equipment Supports, and seismic restraints: To comprise all restraints, hangers, pipe guides, rods, beam clamps, brackets, pipe anchors, other attachments, floor flanges, masonry anchors, bolts, nuts, washers, and other items as required to fully support all piping and equipment installed under this contract inclusive of spring hangers, seismic restraints, and vibration mounts where recommended by equipment manufacturers, where required to meet noise abatement regulations and as necessary to prevent piping and equipment vibrations being transmitted to structure.

3. Provide unions and stop valves at all equipment connections and where required for service, repairs and draining.

4. Piping - General: Piping, Piping installation or hook-up shall mean a complete installation in all respects including pipe, fittings, valves, unions, traps, strainers, specialties and other miscellaneous items to make piping systems and equipment operational.

5. Painting and Identification: As specified in their respective sections of this Contract.

6. Miscellaneous Work: Included shall be all items of materials, piping, controls, wiring and other miscellaneous items not specifically shown on Contract Drawings or called for herein but which are normally furnished and required for a complete installation of this type.

7. Sealing of Openings: Openings left in walls, floors, ceilings or partitions shall be sealed. Finish shall match existing adjoining finish in all respects.

8. Coordination Drawings: The plumbing contractor shall cooperate with the Fire Protection Systems, Mechanical**,** and Electrical contractors in the development of the coordination drawings. The specified order in which the various trade contractors impose their work on the coordination drawings is not intended to grant priority to any one trade contractor in the allocation of space. At the completion of this phase, hold a coordination meeting to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the Work.

1.02 CODES AND STANDARDS

A. It shall be unlawful for any person to perform the work referred to under this Plumbing and Drainage Specifications and/or shown on the Plumbing and Drainage Contract Drawings unless such person is a licensed master plumber, partnership, corporation or other business association as permitted by the New York State Building Code and unless such work is performed under the direct and continuing supervision of a licensed master plumber.

B. Where requirements for products, materials, systems, equipment, methods and other portion of the work specified herein exceed minimum requirements of regulatory agencies having jurisdiction over the construction work, contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Owner.

1.03 TORCH BURNING OPERATION

A. The storing and use of oxygen and combustible gases in conjunction with torch burning apparatus is subject to the Rules and Regulations of the New York State Building and Fire Code. Fire watches shall be provided during all operations using torches for burning, cutting or welding.

B. The cost of permits, certificates, fire watches, apparatus and other items required in the torch burning operation shall be borne by the Contractor at no additional cost to the Owner.

1.04 PROTECTION OF MATERIALS AND WORK

A. Existing Building

1. Open ends of piping shall be temporarily closed by a proper fitting, until piping is approved and ready for service.

2. Equipment and other items shall be protected during the progress of the Work. When the building is practically complete and ready for use the fixtures and other items shall be cleaned and all metal work polished and the entire installation put in perfect working order.

1.05 GUARANTEES AND WARRANTIES

A. The Requirements of Section G01740 and this Article shall apply to Guarantees and Warranties.

B. Contractor's Guarantees: The Contractor guarantees that all Work of this Contract is free from all defects, and is as specified, and that should any defects, which cannot be proven to have been caused by improper use, develop within the space of one year from the date of substantial completion of the Work, such defects shall be made good by the Contractor, free of cost to the Owner.

1.07 OPENINGS AND CHASES

A. Openings through exterior foundation walls shall be made watertight by the Contractor after pipes, conduits and other items passing through the wall have been installed. This building is planned and detailed, and is the intent of these specifications to provide a structure that will prevent the penetration by rodents and vermin of any vacant space where they might find a harborage. The Contractor will be held responsible for securing this condition by the closing of all points of access to such spaces, including the passage of piping and conduits, through all walls, partitions, ceilings and furred out spaces, the closing of access to voids in hollow tile or cinder blocks. There shall be a special inspection of the building with regard to this matter before final acceptance.

1.08 INSTRUCTION OF STAFF

A. After the plumbing, drainage systems have been tested, and fixtures, apparatus and all other items adjusted and operating properly to the satisfaction of the Owner, Contractor shall furnish a competent person to instruct the staff in the operation and maintenance of the systems. Contractor shall video record all the training sessions for various equipment and systems as specified in individual sections of these Specifications. Determination of the date and time of such instruction shall be under the direction of the Owner.

1.10 SUBMITTALS

A. Formal submission for approval of manufacturer is required as per manufacturer/model number or series listed in the specification. Formal submissions are required for materials and appurtenances (ex. sheet metal, pipes, etc.) as defined in the specification. Submittals are always required to verify capacity. Schedules, installation instructions, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.

1.11 CLEANING AND REPAIR

A. At the completion of the Work and before the final inspection is made the Contractor shall thoroughly clean all apparatus, appurtenances, piping, and leave these items free from all marks, scratches, stains, and other damage. All equipment shall be cleaned and left in condition to operate, and the work, as a whole, left in perfect working order. Remove all tools, debris and excess materials from the premises.

B. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, P&D equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

END OF SECTION

SECTION 220523

VALVES

PART 1 GENERAL

1.01 QUALITY ASSURANCE

A. General:
   a. Materials and components manufactured for potable water use shall contain no more than a weighted average of 0.25 percent lead with respect to the wetted surfaces and meet the requirements of NSF/ANSI 372, third part testing and certification.

1.02 ABBREVIATIONS

A. IBBM: Iron body, bronze mounted.

B. OS&Y: Outside screw and yoke.

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets and specifications for each valve type.

1.04 MAINTENANCE

A. Special Tools:

1. One wrench for each type and size wrench operated plug valve.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.

B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.

C. Valve parts of same manufacturer, size and type shall be interchangeable.

D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.

E. Valves which use packing, shall be capable of being packed when wide open and under full working pressure.

F. Size valves the same size as the piping in which they are installed, unless specified otherwise.

2.02 GATE VALVES

A. 125 psig WSP, 200 psig WOG up to 12 inch size, and 150 psig WOG for 14 inch and 16 inch sizes; IBBM OS&Y, bolted bonnet, solid wedge disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 464-1/2, 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco T6170 & F6170, and Stockham G620 & G623

2.03 CHECK VALVES

A. 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.

2.04 BALL VALVES

A. 150 psig WSP, 600 psig WOG, 2 piece bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips, balancing stop, and threaded or solder ends. Acceptable Manufacturers: Conbraco, Hammond, Milwaukee, Nibco, and Watts.

2.05 GLOBE VALVES

A. 2 inches and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, threaded bonnet, hand wheel, teflon composition disc, threaded ends.
B. 2-1/2 inches and Larger: MSS SP 85, Class 125, cast iron body, bronze trim, hand wheel, outside screw and yoke, flanged ends.
C. Acceptable Manufacturers: Crane, Milwaukee Valve, NIBCO, and Watts.

2.06 PLUG VALVES

A. Lubricated plug valves for use on gas distribution piping; mains, branches and base of risers shall be cast iron body, rated for 200 pounds cold working pressure and shall be wrench operated.
B. Lubricated plug valves 2" and smaller shall be short pattern threaded; 2½" and larger shall be regular pattern flanged.
C. Lubricated plug valves shall be Nordstrom Valves Inc. Fig. 142 for sizes 2" and smaller, Fig. 115 for sizes 2½" through 4" inclusive, Fig. 165 for sizes 6" and 8"; or Walworth Fig. 1796 for sizes 2" and smaller, Fig. 1700F for sizes 2½" through 8".
D. Gas cocks shall be for use only as manual gas shut-off valves at each piece of gas burning equipment; shall be of the plug type, bronze construction with check, nut and washer bottom and tee handle. Gas cocks shall be Fig. 10596 as

manufactured by A. Y. McDonald Mfg. Co., or Series 52 as manufactured by Conbraco Industries, Inc.

a. Gas cocks shall only be used on piping 1" and smaller.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install valves at locations noted on the drawings or specified.

END OF SECTION

SECTION 22 05 29

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. N/A

1.03 SUBMITTALS

A. Shop Drawings:

1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.

2. Details of pipe anchors.

3. Details and method of installing sway braces for cast iron soil pipe.

B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with the applicable requirements of the ASME B31 Piping Codes.

2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.

3. Materials for use in Sprinkler Systems and Standpipe and Hose Systems shall comply with the requirements of NFPA 13 and NFPA 14 as applicable.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.

1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10

B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18

C. Pipe Covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.

D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.

1. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.

2. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.

E. Adjustable Floor Rests and Base Flanges: Steel.

F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

G. Riser Clamps: Malleable iron or steel.

2.02 ANCHORS AND ATTACHMENTS

A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.

B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.

C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.

D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.

E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series.

F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).

G. Metal Deck Ceiling Bolts: B-Line Systems' Fig. B3019.

H. Continuous Slotted Type Concrete Insert, Galvanized:

1. Load Rating 800 lbs/ft: Kindorf's D-986.

2. Load Rating 1500 lbs/ft: Kindorf's D-980.

3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.

4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.

I. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts.

J. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch diameter bolts having special wedge shaped heads.

2.03 FASTENERS

A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.04 SHOP PAINTING AND PLATING

A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with metal primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.

B. Hanger supports for chromium plated pipe shall be chromium plated brass.

2.05 SLEEVES

A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for pipes through Rated Construction: Galvanized steel, thickness as required to meet UL1479 requirements.

C. Sealant: Acrylic; refer to Division 07.

2.06 FIRESTOPPING

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. Dow Corning Corp.
2. Fire Trak Corp.
3. Hilti Corp.
4. 3M fire Protection Products
5. Specified Technology, Inc.
6. Substitutions: Division 01 - Product Requirements.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Multiple component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Multiple component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

C. Firestopping system shall meet UL1479 requirements.

D. Color: As selected from manufacturer's full range of colors.

2.07 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent:
1. Mineral fiberboard.
2. Sheet metal.

3. Alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:
1. Furnish UL listed products.
2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.

PART 3 EXECUTION

3.01 PREPARATORY WORK

A. Place inserts into construction form work expeditiously, so as not to delay the Work.

3.02 INSTALLATION

A. Do not hang or support one pipe from another or from ductwork.

1. Do not bend threaded rod.

B. Support all insulated horizontal piping conveying fluids below ambient temperature, by means of hangers or supports with insulation shields installed outside of the insulation.

C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.

1. For Steel, and Threaded Brass Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and up	12

2. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	6
2 and over	10

3. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.

4. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.

5. For Branch Piping Runs and Runouts over 5 feet in Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.

6. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.

7. Support floor drain traps from the overhead construction, with hangers of type and design as required and approved. Overhead supports are not required for floor drain traps installed directly below earth supported concrete floors.

D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	PIPE	TUBING	PIPE	TUBING
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4

1. Size hanger rods, for piping over 12 inches in size and multiple line supports, based on a safety factor of five for the ultimate strength of the materials being used.
2. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.

2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.

3. Install intermediate supports between riser clamps on maximum 6 foot centers, for copper tubing risers 1-1/4" in size and smaller, installed in finished rooms or spaces other than mechanical equipment machine or steam service rooms, or penthouse mechanical equipment rooms.

4. Support cast iron risers, by means of heavy duty hangers installed close to the base of the pipe risers, and 1/4 inch thick malleable iron or steel riser clamps with extension arms at each floor level, with the distance between clamps not to exceed 25 feet. Support cast iron risers in vertical shafts equivalent to the aforementioned.

5. Support hubless cast iron risers, by means of heavy duty hangers installed close to the base of the pipe risers, and by malleable iron or steel riser clamps with the extension arms at each floor level, with the distance between clamps or intermediate supports not to exceed 12 feet. Support risers in vertical shafts equivalent to the aforementioned.

F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

G. Underground Cast Iron Pipe Supports: Firmly bed pipe laid underground, on solid ground along bottom of pipe. Install masonry piers for pipe laid in disturbed or excavated soil or where suitable bearing cannot be obtained. Support pipe, laid proximate to building walls in disturbed or excavated soil, or where suitable bearing cannot be obtained, by means of wall brackets or hold-fasts secured to walls in an approved manner.

3.03 UPPER HANGER ATTACHMENTS

A. General:

1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.

2. Do not attach hangers to steel decks that are not to receive concrete fill.

3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.

4. Do not use flat bars or bent rods as upper hanger attachments.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.

2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.

3. Do not drill holes in main structural steel members.

4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer's recommended limits.

C. Attachment to Existing Cast-In-Place Concrete:

1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.

2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

3.04 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

A. Install pipe anchors, restraints and sway braces, at locations noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, away from anchor points. Install anchors independent of all hangers and supports, and in a manner that will not affect the structural integrity of the building.

B. Cast Iron Soil Piping Systems:

1. Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway braces, of design, number and location in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

2. Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or other suitable method at each branch opening, or change of direction in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

3.05 PIPING IN TUNNELS

A. Support piping in tunnels on adjustable stanchions, fabricated in accordance with the details on the Drawings, unless otherwise indicated. Install, secure and be responsible for the proper locations of all cast-in-place inserts and stanchion supports, in ample time so as not to delay construction Work. Secure tops of stanchions to overhead construction, as required and approved.

3.06 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.07 PIPE INSULATION SHIELDS

A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

3.08 PIPE COVERING PROTECTION SADDLES

A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

3.09 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel escutcheons at finished surfaces.

3.10 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping and other items, requiring firestopping to meet UL1479 requirements.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.

D. Place intumescent coating in sufficient coats to achieve rating required.

E. Remove dam material after firestopping material has cured.

F. Fire Rated Surface:
   1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Pack void with backing material.
      d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.

G. Non-Rated Surfaces:
   1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Install type of firestopping material recommended by manufacturer.
   2. Install escutcheons, floor plates or ceiling plates where piping, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
   3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
   4. Interior partitions: Seal pipe penetrations at computer rooms, telecommunication rooms and data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit

3.11 FIELD QUALITY CONTROL

A. Division 01 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.12 CLEANING

A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

B. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 220553

PIPE AND VALVE IDENTIFICATION

PART 1 GENERAL

1.01 REFERENCES

A. ANSI A13.1 - Scheme for Identification of Piping Systems.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. W.H. Brady Co., Milwaukee, WI.

B. Emed Co., Buffalo, NY.

C. Panduit Corp., Tinley Park, IL.

D. Seton Nameplate Corp., New Haven, CT.

2.02 PIPE MARKERS AND ACCESSORIES

A. Snap-on Marker: One piece wrap around type constructed of pre-coiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.

B. Strap-On Marker: Strip type constructed of pre-coiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.

C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.

D. Pipe Marker Legend and Color Field Sizes:

OUTSIDE DIAMETER OF PIPE OR INSULATION (Inches)	LETTER SIZE (Inches)	LENGTH OF COLOR FIELD (Inches)
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1-1/4	12

E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.

1. Plain Tape: Unprinted type; color to match pipe marker background.

2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.

F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

2.03 PIPE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B & S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.

B. Size: 2 inch square tag.

C. Fasteners: Brass “S” hook or brass jack chain of size as required for pipe to which tag is attached.

2.04 VALVE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B & S gage brass, with 1/4 inch high valve service abbreviated lettering on one line over 1/2 inch high valve service chart number, both deep stamped and black filled; and with 3/16 inch top hole for fastener.

B. Sizes:

1. Plumbing Use: 1-1/2 inch hexagon.

C. Fasteners: Brass “S” hook or brass jack chain of size as required for valve stem or handle to which tag is attached.

2.05 VALVE SERVICE IDENTIFICATION CHART FRAMES

A. Type: Satin finished extruded aluminum frame with rigid clear plastic glazing, size to fit 8-1/2 x 11 inches valve chart.

PART 3 EXECUTION

3.01 PREPARATION

A. Complete testing, insulation and finish painting work prior to completing the Work of this Section.

B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.

C. Remove dust from insulation surfaces with clean cloths prior to installing piping identification.

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Stick-On Pipe Markers:

1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.

2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.

C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified location, 90 degrees apart on visible side of pipe.

D. Pipe Service Identification Tags: Attach tags to piping being identified with "S" hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

A. Piping Identification Types:

1. Piping or Insulation under 3/4 inch od: Pipe identification tags.

2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.

3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.

B. Identify exposed piping, bare or insulated, as to content, size of pipe and direction of flow, with the following exceptions:

1. Piping in non-walk-in tunnels or underground conduits between manholes.

2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.

3. Piping in finished spaces such as offices, class rooms, wards, toilet rooms, shower rooms and spaces as specified.

C. Locate piping identification to be visible from exposed points of observation.

1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.

2. Where 2 or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

A. Valve Service Identification Tags:

1. Tag control valves, except valves at equipment, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:

a. Domestic water valves controlling mains, risers and branch runouts.

b. Gas valves controlling mains, risers, and branch runouts.

c. Valves in sprinkler and fire standpipe systems, except hose valves.

B. Valve Service Identification Charts:

1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white bond paper, indicating valve number, service and location.
2. Hang framed charts at locations as directed.

END OF SECTION

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SECTION 220576

DRAINAGE ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

A. Comply with the applicable requirements of ASME A112.36.2M - Cleanouts, and ASME A112.1.2 - Drainage Funnels and Air Gaps.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified except fasteners.

1.03 MAINTENANCE

A. Special Tools: Deliver the following to the Director's Representative:

1. Tools for Vandal Resistant Fasteners: One for each type and size.

2. T-Handle Wrench for Cleanout Plugs: One for each type and size.

PART 2 PRODUCTS

2.01 CLEANOUT PLUG

A. Cast brass or bronze, with threaded end, and raised or countersunk head.

1. Tapped head for attachment of cleanout wall or deck plate covers where required.

B. Anti-Seize Lubricant: Never-Seez by Bostik Chemical Group, Broadview, IL; Molycote 1000 by Dow Corning Corp, Midland, MI; Anti-Seize Lubricant by Loctite Corp, Newington, CT.

2.02 CLEANOUT

A. Threaded pipe fitting or cast iron ferrule with gas tight cleanout plug.

2.03 CLEANOUT WALL PLATE

A. Round, stainless steel or polished chrome plated bronze cover plate with stainless steel vandal resistant fastener to secure to cleanout plug.

2.04 CLEANOUT DECK PLATE

A. Standard duty floor cleanout fitting with coated cast iron body; round, polished nickel bronze scoriated top secured to cleanout plug with stainless steel vandal resistant fastener; threaded height adjustment, cast iron head, gas tight cleanout plug, and connection to match piping option selected.

B. Membrane flange and clamping collar, secured with corrosion resistant fasteners.

2.05 CONDUCTOR EXPANSION JOINT

A. Coated cast iron body with brass telescoping sleeve, adjustable packing gland with graphite, neoprene or mineral fiber gasket, and connection to match piping option selected.

2.06 AIR GAP FITTING

A. Coated cast iron body with air gaps, set screw or threaded inlet, and outlet connection to match piping option selected.

2.07 INDIRECT WASTE FUNNEL

A. Combination Funnel Drain and P Trap: Polished chrome plated cast brass construction.

1. Funnel: 4 inch top dia., 4 inches deep, with threaded outlet.

2. P Trap: Bottom cleanout, threaded inlet, and outlet connection to match piping option selected.

2.08 FASTENERS

A. Corrosion Resistant Fasteners: Brass, bronze, or Type 302 or 304 stainless steel bolts.

B. Vandal Resistant Fasteners: Torx head with center pin.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Cleanout Plug: Lubricate threads with anti-seize lubricant before final installation.

C. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

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SECTION 220577

FLOOR AND AREA DRAINS

PART 1 GENERAL

1.01 REFERENCES

A. Unless otherwise specified, the Work of this section shall meet the applicable requirements of FS WW-P-541 - Plumbing Fixtures, and ASME A112.21.1M - Floor Drains.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each type drain specified.

1.03 MAINTENANCE

A. Special Tools: Deliver to the Director's Representative.

1. Tools for Vandal Resistant Fasteners: One for each type and size.

PART 2 PRODUCTS

2.01 TYPE A FLOOR DRAIN

A. Drain Body: Coated cast iron, two-piece body with reversible flashing clamp, minimum 9 inch dia drainage flange, corrosion resistant bolts, weep holes, bottom outlet, and connection to match piping option selected.

B. Strainer Head: Round, minimum 7 inch dia, nickel bronze with threaded shank for height adjustment.

C. Strainer Grate: Polished nickel bronze, heel proof; secured with stainless steel vandal resistant fasteners.

D. Acceptable Drain Series: Josam 30000A, Smith 2010A, Wade W1100, and Zurn Z415.

2.02 FASTENERS

A. Corrosion Resistant Fasteners: Brass, bronze, or Type 302 or 304 or stainless steel bolts.

B. Vandal Resistant Fasteners: Torx head with center pin.

2.03 FREE AREA OF GRATE

A. Minimum strainer grate free area listed below for each connecting pipe size:

CONNECTING PIPE SIZE (Inches Nominal)	INTERIOR DRAINS FREE AREA (Square Inches)	EXTERIOR DRAINS FREE AREA (Square Inches)
1-1/2	3.06	4.08
2	4.71	6.28
3	10.59	14.12
4	18.90	25.20
5	29.40	39.20
6	42.45	56.60
8	75.38	100.50

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Protect weep holes from plugging during installation. Rod out weep holes after installation to remove obstructions.

C. Adjust strainer head to height indicated. If height not indicated, set at 1/2 inch below finished floor elevation.

D. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

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SECTION 220700

PIPING INSULATION

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

B. Painting: Section 099103.

C. Pipe Hangers and Supports: Section 220529.

1.02 ABBREVIATIONS

A. FS: Federal Specification.

B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.

C. pcf: Pounds per cubic foot.

D. PVC: Polyvinylchloride.

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:
1. Insulation Materials.
2. Jacket Materials.

B. Quality Control Submittals:
1. Installers Qualification Data:
a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.
b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

1.04 QUALITY ASSURANCE

A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.

B. Regulatory Requirements:

1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS

2.01 PIPING INSULATION

A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
   1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547:
      a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
   2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
   3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
      a. Suitable for temperatures up to 450 degrees F.

B. Flexible Elastomeric Foam Insulation:
   1. FM tested and approved, meeting the following:
      a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
      b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
      c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
   2. Pipe Insulation: ASTM C 534, Type I.
   3. Polyethylene and polyolefin insulation is not acceptable.

C. High Density Jacketed Insulation Inserts for Hangers and Supports:
   1. For Use with Fibrous Glass Insulation:
      a. Cold Service Piping:
         1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
      b. Hot Service Piping:
         1) Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
         2) Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
   2. For Use with Flexible Elastomeric Foam Insulation: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.

D. Cements:
   1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
   2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.02 INSULATION JACKETS

A. Laminated Vapor Barrier Jackets for Piping: Factory applied by insulation manufacturer, conforming to ASTM C 1136, Type I.
   1. Type I: Reinforced white kraft and aluminum foil laminate with kraft facing out.
      a. Pipe Jackets: Furnished with integral 1-1/2 inch self sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.
   2. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.

B. Canvas Jackets: Cotton duck, fire retardant, complying with NFPA 701, 4 oz or 6 oz per sq yd as specified.

C. Premolded PVC Fitting Jackets:
   1. Constructed of high impact, UV resistant PVC.
      a. ASTM D 1784, Class 14253-C.
      b. Working Temperature: 0-150 degrees F.

D. Metal Jacketing:
   1. Aluminum: ASTM B 209, Alloys 1100, 30003, 3105 or 5005, Temper H14, 0.016 inch thick.
      a. Factory Pre-formed Sectional Pipe Jacketing:
         1) Smooth outer finish with integral bonded laminated polyethylene film - kraft paper moisture barrier underside.
         2) Pittsburgh or modified Pittsburgh longitudinal lock seams.
         3) 2 inch overlapping circumferential joints with integral locking clips, or butt joints sealed with 2 inch wide mastic backed aluminum snap bands.
      b. Fastening Devices:
         1) Strapping: Type 18-8 stainless steel, 0.020 inch thick, 1/2 and 3/4 inch wide as specified.
         2) Wing Seals: Type 18-8 stainless steel, 0.032 inch thick.
         3) Sheet Metal Screws: Panhead, Type A, hardened aluminum, and stainless steel.

2.03 ADHESIVES, MASTICS, AND SEALERS

A. Lagging Adhesive (Canvas Jackets): Childers' CP-50AMV1, Epolux's Cadalag 336, Foster's 30-36.

B. Vapor Lap Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-60 or 85-20.

C. Vapor Barrier Mastic(Fibrous Glass Insulation): Permeance shall be .03 perms or less at 45 mils dry per ASTM E 96. Childers' CP-34, Epolux's Cadalar 670, Foster's 30-65.

D. Adhesive (Flexible Elastomeric Foam): Armstrong's 520, Childers' CP-82, Epolux's Cadoprene 488, Foster's 85-75. 5 gallon cans only

E. Adhesive (Fiberglass Duct Liner): Childers' Chil Quick CP-127, Foster Vapor Fas 85-60. Must comply with ASTM C 916, Type II

.

F. Weather Barrier Breather Mastic (Reinforcing Membrane): Childers' VI-CRYL CP-10/11, Foster's Weatherite 46-50.

G. Sealant (Metal Pipe Jacket): Non hardening elastomeric sealants. Foster Elastolar 95-44, Childers Chil Byl CP-76, Pittsburgh Corning 727

H. Reinforcing Membrane: Childers' Chil Glas #10, Foster Mast a Fab, Pittsburgh Corning PC 79

2.04 MISCELLANEOUS MATERIALS

A. Pressure Sensitive Tape for Sealing Laminated Jackets:
1. Acceptable Manufacturers: Alpha Associates, Ideal Tape, Morgan Adhesive.
2. Type: Same construction as jacket.

B. Wire, Bands, and Wire Mesh:
1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.
2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.
3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

C. Reinforcing Membrane: Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childer's Chil-Glas, Foster's MAST-A-FAB.

PART 3 EXECUTION

3.01 PREPARATION

A. Perform the following before starting insulation Work:
1. Install hangers, supports and appurtenances in their permanent locations.
2. Complete testing of piping.
3. Clean and dry surfaces to be insulated.

3.02 INSTALLATION, GENERAL

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.

1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 078400.
   a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.

C. Do not intermix different insulation materials on individual runs of piping.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

A. Reset and realign hangers and supports if they are displaced while installing insulation.

B. Install high density jacketed insulation inserts at hangers and supports for insulated piping.

C. Insulation Inserts For Use with Fibrous Glass Insulation:
1. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
   a. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, trapezes, etc.; fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.
      1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.

D. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation:
1. Where clevis hangers are used, install insulation shields with hardwood filler pieces, same thickness as adjoining insulation, inserted in undersized die cut or slotted holes in insulation at support points.
2. Contour hardwood blocks to match the curvature of pipe, and shield.
3. Coat dowels and blocks with insulation adhesive, and insert while still wet.
4. Vapor seal outer surfaces of dowels and blocks with adhesive after insertion.
5. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
Thru 1-1/2”	2 dowel plugs	6 o’clock; in tandem
2” thru 4”	1 block, 2 dowel plugs	6 o’clock, and 4 & 8 o’clock respectively

3.04 INSTALLATION OF FIBROUS GLASS COLD SERVICE INSULATION

A. Install insulation materials with a field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket, unless otherwise specified.

B. Piping:
1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips.
a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as jacket, may be used in lieu of butt strips.
2. Bed insulation in a 2-inch wide band of vapor barrier mastic, and vapor seal exposed ends of insulation with vapor barrier mastic at each butt joint between pipe insulation and equipment, fittings or flanges at the following intervals:
a. Horizontal Pipe Runs: 21 ft.
b. Vertical Pipe Runs: 9 ft.

C. Fittings, Valves, Flanges and Irregular Surfaces:
1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as pipe insulation.
2. Secure insulation in place with 16-gage wire, with ends twisted and turned down into insulation.
3. Butt insulation against pipe insulation and bond with joint sealer.
4. Insulate valves up to and including bonnets, without interfering with packing nuts.
5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
6. When insulating cement has dried, seal fitting, valve and flange insulation, by imbedding a layer of reinforcing membrane or 4 oz. canvas jacket between 2 flood coats of vapor barrier mastic, each 1/8 inch thick wet.
7. Lap reinforcing membrane or canvas on itself and adjoining pipe insulation at least 2 inches.
8. Trowel, brush or rubber glove outside coat over entire insulated surface.
9. Exceptions:
a. Type C and D Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
1) Additional insulation inserts are required for services with operating temperatures under 45 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not go below 45 degrees F.

3.05 INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.

B. Canvas Jackets on Piping, Fittings, Valves, Flanges, Unions, and Irregular Surfaces:
1. For Piping 2 inch Size and Smaller: 4 oz per sq yd unless otherwise specified.
2. For Piping Over 2 inch Size: 6 oz per sq yd unless otherwise specified.

C. Piping:
1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide adhesive backed butt strips.
a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as the jacket, may be used in lieu of butt strips.
2. Fill voids in insulation at hanger with insulating cement.
3. Exceptions:
a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces and Concealed Piping: Butt insulation joints together and secure minimum 1-1/2 inch wide longitudinal jacket laps and 3 inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4 inch centers. Fill voids in insulation at hangers with insulating cement.

D. Fittings, Valves, Flanges and Irregular Surfaces:
1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as insulation.
2. Secure in place with 16-gage wire, with ends twisted and turned down into insulation.
3. Butt fitting, valve and flange insulation against pipe insulation, and fill voids with insulating cement.
4. Insulate valves up to and including bonnets, without interfering with packing nuts.
5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
6. After insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz or 6 oz canvas jacket as required by pipe size.
a. Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
b. Size entire canvas jacket with lagging adhesive.
7. Exceptions:
a. In Types E, and F Service Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
1) Additional insulation inserts are required for services with operating temperatures over 250 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not exceed 150 degrees F.
b. In Types E, and F Service Piping Systems: Insulate fittings, valves, and irregular surfaces 3 inch size and smaller with insulating cement covered with 4 oz or 6 oz canvas jacket as required by pipe size.
1) Terminate pipe insulation adjacent to flanges and unions with insulating cement, trowelled down to pipe on a bevel.
c. Fittings, Valves, Flanges, and Irregular Surfaces In Concealed Piping, Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Rooms, Unfinished Spaces, and Tunnels: Sizing of canvas surface is not required.

3.06 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive.
   1. Where the slip-on technique is not possible, slit the insulation and install.
   2. Re-seal with adhesive, making sure the mating surfaces are completely joined.

B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.
   1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation with adhesive.

C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.

D. Piping Exposed Exterior to a Building, Totally Exposed to the Elements:
   1. Apply flexible elastomeric foam insulation to piping with adhesive.
   2. Apply reinforcing membrane around piping insulation with adhesive or mastic.
   3. Adhesive Applied System: Apply 2 coats of finish. See Section 099103.
   4. Mastic Applied System: Apply another coat of mastic over reinforcing membrane.

3.07 INSTALLATION OF SHEET METAL JACKETING ON PIPING

A. Secure jacketing to insulated piping with preformed aluminum snap straps and stainless steel strapping installed with special banding wrench.

B. Jacket exposed insulated fittings, valves and flanges with mitred sections of aluminum jacketing.
   1. Seal joints with sealant and secure with preformed aluminum bands.
   3. Substitution: Factory fabricated, preformed, sectional aluminum fitting covers or premolded polyvinylchloride fitting covers may be used in lieu of mitred sections of aluminum jacketing for covering fittings, valves and flanges.

3.08 FIELD QUALITY CONTROL

A. Field Samples: The Director's Representative, may at his discretion, take field samples of installed insulation for the purpose of checking materials and application. Reinsulate sample cut areas.

3.09 PIPING INSULATION SCHEDULE

A. Insulate all cold service and hot service piping, and appurtenances except where otherwise specified.

B. Schedule of Items Not to be Insulated:
   1. Chrome plated piping, unless otherwise specified.

2. Exposed piping in finished spaces, serving one fixture, or piece of equipment, and which connection from the main, branch, or riser, is 24 inches or less in length.
3. Water heater blow-off piping.
4. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves.
5. Water meters.
6. Piping buried in the ground, unless otherwise specified herein.
7. Items installed by others, unless otherwise specified herein.
8. Sanitary drainage piping, unless otherwise specified herein.
9. Mechanical equipment with factory applied steel jacket.
10. Hot service piping 81 degrees F to 104 degrees F.
11. Flanges and unions in Type E, F, and G service piping systems.
12. Sprinkler and standpipe piping, unless otherwise specified.

3.10 COLD SERVICE INSULATION MATERIAL SCHEDULE

TYPE	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
C	Fluids (except domestic cold water) 40 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & less Over 1-1/2	1 1-1/2
D	Domestic cold water, and as specified. 33 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All Sizes	1/2

A. NOTES:
1. Sprinkler and Standpipe Piping (First 10 feet connected to domestic water main within building): Insulate with same materials and thicknesses specified for domestic cold water.
3. Piping Serving Handicapped Accessible Lavatories:
   a. Insulate exposed hot water supply and waste piping with flexible elastomeric foam pipe insulation.
   b. Insulate exposed hot and cold water supply, and waste piping with under lav piping protection cover. Install fasteners thru each pair of holes in insulated safety wrap.

3.11 HOT SERVICE INSULATION MATERIAL SCHEDULE

	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
E	Water and other fluids 105 F to140 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & Less Over 1-1/2	1 2

3.12 SCHEDULE OF METAL JACKETING FOR INSULATED PIPE

C. General:
1. Jacket exposed insulated piping with preformed sectional aluminum metal pipe jacketing.

END OF SECTION

SECTION 220800

CLEANING AND TESTING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Testing Sprinkler System: NFPA-13.

1.02 SUBMITTALS

A. Quality Control Submittals
1. Test Reports (Field Tests): Submit data for each system tested, and/or disinfected; include date performed, description, and test results for each system.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.04 PROJECT CONDITIONS

A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.05 SEQUENCING AND SCHEDULING

A. Transmit written notification of proposed date and time of operational tests to the Director's Representative at least 5 days in advance of such tests.

B. Perform cleaning and testing Work in the presence of the Director's Representative.

C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Test Equipment and Instruments: Type and kind as required for the particular system under test.

B. Test Media (air, vacuum, water): As specified for the particular piping or system under test.

C. Cleaning Agent (water): As specified for the particular piping, apparatus or system being cleaned.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

3.02 PRESSURE TESTS - PIPING

A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.

B. Water Systems:
1. Domestic water (potable cold, domestic hot and recirculation) inside buildings:
a. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig minimum for 4 hours.
b. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 4 hours.

C. Gas Piping: Before backfilling or concealment perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4 inches to 6 inches water column, air test at 15 inches Hg for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.

D. Air Piping:
1. Compressed Air: Test with air at 150 psig for one hour.
2. Check joints for leaks with soap suds.

E. Drainage, Vent, Conductor and Roof Drain Piping (Inside Buildings): Perform tests before fixtures are installed. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water. Test joints

under a minimum head of 10 feet of water, except the uppermost section. Test the uppermost section to overflowing.

3.03 TESTING OF EQUIPMENT, APPARATUS AND APPURTENANCES

A. Relief Valves: Increase pressure in equipment or apparatus to relief valve setting, to test opening of valves at required relief pressures.

3.04 DISINFECTION OF POTABLE WATER SYSTEMS

A. Disinfect potable water pipe and equipment installed in the Work of this Contract.
1. Refer to Specification Section 221100, Paragraph 3.6 for cleaning and disinfection procedure.
2. After the retention period, discharge the solution to an approved waste and flush the system thoroughly with water until substantially all traces of chlorine are removed. Drain and flush water storage equipment if installed.

B. Connect plumbing fixtures and equipment and place the system into service. Prevent recontamination of the piping during this phase of the Work.

3.05 LEAD TESTING

A. Engage the services of an independent testing service to test the school's drinking water for lead contaminates in accordance with the Public Health Law Sections 1370-a and 1110, Subpart 67-4, Title 10 (HEALTH) of the official compilation of codes, rules and regulations of the State of New York.

END OF SECTION

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SECTION 221100

DOMESTIC WATER PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Domestic water piping, within 5 feet of building.
2. Domestic water piping, above grade.
3. Unions and flanges.
4. Valves.
5. Strainers.
6. Hose bibs.
7. Hydrants.
8. Backflow preventers.
9. Water hammer arrestors.
10. Thermostatic Mixing Valves.

1.2 REFERENCES

A. American National Standards Institute ANSI.

B. American Society of Mechanical Engineers (ASME).

C. American Society of Sanitary Engineering (ASSE).

D. ASTM International:

E. American Welding Society (AWS).

F. American Water Works Association: (WWA).

G. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS).

H. National Electrical Manufacturers Association (NEMA).

I. Plumbing and Drainage Institute (PDI).

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.

2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.

3. Hangers and Supports: Submit manufacturers catalog information including load capacity.

4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

5. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of valves and equipment.

C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 QUALITY ASSURANCE

A. General:

1. Materials and components manufactured for potable water use shall contain no more than a weighted average of 0.25 percent lead with respect to the wetted surfaces and meet the requirements of NSF/ANSI 372, third part testing and certification. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01300 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01600 - Product Requirements: Product storage and handling requirements.

B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.11 WARRANTY

A. Section 01700 - Execution Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for domestic water piping.

1.12 EXTRA MATERIALS

A. Section 01700 - Execution Requirements: Spare parts and maintenance products.

B. Furnish two packing kits for each size valve and two pump seals for each pump model.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Ductile Iron Pipe: AWWA C151.

1. Fittings: AWWA C110, ductile iron, standard thickness.

2. Joints: AWWA C111, rubber gasket with rods.

3. Jackets: AWWA C105 polyethylene jacket.

B. Copper Tubing: ASTM B88, Type K, annealed.

1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.

2. Joints: Compression connection or Brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

C. PVC Pipe: ASTM D1785, Schedule 80 ASTM D2241, polyvinyl chloride (PVC) material.

1. Fittings: ASTM D2467, Schedule 80, PVC.

2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

D. Polyethylene/Aluminum Composition Tubing: ASTM F1281 or ASTM F1282.

1. Fittings and Joints: Brass compression type.

E. High Density Polyethylene (HDPE) Piping

a. Smooth interior annular exterior corrugated polyethylene pipe as per ASTM D3350 minimum cell classification 335420C; AASHTO M294, Type S or AASHTO MP7-97, Type S. The closed cell structural core shall have a compressive strength no less than 20 lbs/square inch, which provides high stress resistance to cracks.

b. The bell-and-spigot HDPE piping network shall be joined using watertight connections in accordance with the requirements of ASTM D3212. Elastomeric seals (gaskets) made of polyisoprene and meeting the requirements of ASTM F477 shall show no visible leaks when tested under a 10 ft hydrostatic water test.

c. To preclude crumbling and provide better joint performance of the HDPE pipe, the bell and spigot ends shall be reinforced, including a bell tolerance device. The bell tolerance device must be installed by the pipe manufacturer.

d. Approved Manufacturers:

Hancor Inc.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88 (ASTM B88M), Type L, hard drawn.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.

2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F. Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

B. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, grooved ends.

1. Fittings: ASTM A395/A395M and ASTM A536 ductile iron, grooved ends.

2. Joints: Grooved mechanical couplings meeting ASTM F1476.

a. Housing Clamps: ASTM A395 and ASTM A536 ductile iron, hot dipped galvanized, compatible with steel piping sizes, rigid type.

b. Gasket: Elastomer composition for operating temperature range from -30 degrees F to 230 degrees F.

c. Accessories: Steel bolts, nuts, and washers.

C. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M, chlorinated polyvinyl chloride (CPVC) material.

1. Fittings: ASTM D2846/D2846M, ASTM F437, ASTM F438, ASTM F439, or ASTM F441/F441M, CPVC.

2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.

D. PVC Pipe: ASTM D1785 Schedule 40, or ASTM D2241 SDR-26 for not less than 150 psi pressure rating, polyvinyl chloride (PVC) material.

1. Fittings: ASTM D2466, Schedule 40, PVC ASTM D2467, Schedule 80, PVC.

2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.3 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:

1. Ferrous Piping: Class 150, malleable iron, threaded.

2. Copper Piping: Class 150, bronze unions with soldered.

3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

4. PVC Piping: PVC.

5. CPVC Piping: CPVC.

B. Flanges for Pipe 2-1/2 inches and Larger:

1. Ferrous Piping: Class 150, forged steel, slip-on flanges.

2. Copper Piping: Class 150, slip-on bronze flanges.

3. PVC Piping: PVC flanges.

4. CPVC Piping: CPVC flanges.

5. Gaskets: 1/16 inch thick preformed neoprene gaskets.

C. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or ASTM D2464, Schedule 80, threaded, PVC pipe.

2.4 STRAINERS

A. Strainers in water service piping installed upstream of water meters shall be cast bronze body with stainless steel elements. Strainers shall be rated at 150 psi working pressure. Strainers shall be of the same manufacturer as the compound water meters.

B. Strainers in water service piping installed upstream of Double Detector Check Valves shall be flanged basket type, cast iron body with bronze basket and bronze handle and 1/16" perforations, good for the same working pressure as specified for fittings. Strainers shall be Sarco Type 528-B, Mueller Steam Specialty No. 165, or J.R. Smith No. 8795.

C. Y-Strainers

1. Except as otherwise noted strainers shall be full size Y-pattern provided with removable cylindrical or conical screens of monel or stainless steel and suitable flanges or tapping to connect with the piping they serve.

2. Strainers shall be cast iron on iron and steel piping and bronze on brass or copper piping except as otherwise noted in other sections of the specifications.

3. Screen perforations for water shall be 1/16" (0.57 diameter) for pipe sizes up to 3" and 1/8" for 4" and above.

D. Provide valves dirt blow-off connection for each Y-strainer. The blow-off connection shall terminate with a gate valve and nipple.

E. Bronze Y-Strainers shall be Sarco Type BT or Mueller Steam Specialty No. 352.

F. Cast iron Y-Strainers shall be Sarco Type IT or Mueller Steam Specialty No.11.

2.5 HOSE BIBBS

A. Manufacturers:

1. Mifab Model MHY-20.

2. Substitutions: Section 01600 - Product Requirements.

B. Furnish materials in accordance with NYS standards.

C. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with hand wheel, [integral vacuum breaker in conformance with ASSE 1011.

D. Interior Mixing: Bronze or brass, wall mounted, double service faucet with hose thread spout, integral stops, chrome plated where exposed with hand wheels, and vacuum breaker in conformance with ASSE 1011.

2.6 HYDRANTS

A. Wall Hydrant:

1. Wall hydrants shall be nickel bronze with nickel bronze casing, polished nickel bronze face, brass operating parts throughout, adjustable wall clamp, renewable nylon seat, 3/4" HPT standard hose outlet with integral vacuum breaker, 3/4" IPS male thread ground joint union elbow adapter, nickel bronze access box and nickel bronze hinged cover with locking device. Furnish and deliver four (4) operating keys to the Custodian. Wall hydrants shall be Josam 71000, Jay R. Smith 5509-E, Wade W-8625, Zurn Z-1300.

B. Post Hydrant:

1. Provide post hydrants where indicated on the Drawings. Post Hydrant shall be cast iron non-freeze with aluminum housing, brass casing, brass valve housing, brass removable operating parts and neoprene washers, removable handle with 3/4" hose connection, 3/4" IPS inlet, approved equal to Josam 71700, Smith 5910, Zurn 1385, or Wade W-8610. For number, location, depth, etc., see Drawings.

2.7 BACKFLOW PREVENTERS

A. Manufacturers:

1. Wilkins Series 575.

2. Watts 909.

3. Febco 825Y.

4. Conbraco 40-200 series.

5. Substitutions: Section 01600 - Product Requirements.

B. Furnish materials in accordance with NYS standards.

C. Reduced Pressure Backflow Preventers:

1. Comply with ASSE 1013.

2. Bronze body, with bronze internal parts and stainless steel springs.

3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

D. Double Check Valve Assemblies: Comply with ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.8 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Josam Series 75000.

2. Zurn Series Z-1700.
3. Smith NYBE Series 5000.

4. Substitutions: Section 01600 - Product Requirements.

B. Furnish materials in accordance with NYS standards.

C. ASSE 1010; stainless steel construction, bellows type sized in accordance with PDI WH-201.

D. Pre-charged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.9 THERMOSTATIC MIXING VALVES

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. Leonard Valve
2. Bradley
3. Lawler
4. Substitutions: Division 01 - Product Requirements.

B. Valve: Bronze or cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment. Conform to ASSE 1070 to temper water to maximum 110 degrees F.

C. Capacity: Listed on Drawings.

D. Accessories:
1. Check valve on inlets.
2. Volume control shut-off valve on outlet.
3. Stem thermometer on outlet.
4. Strainer stop checks on inlets.

2.10 BEDDING AND COVER MATERIALS

A. Bedding: Fill as specified in Division 31.

B. Cover: Fill as specified in Division 31.

C. Soil Backfill from Above Pipe to Finish Grade: Soil as specified in Division 31. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - SERVICE CONNECTIONS

A. Provide new water service complete with approved [[reduced pressure] [double check] back-flow preventer and] water meter with by-pass valves [pressure reducing valve,] [and strainer].

B. Provide sleeve in wall for service main and support at wall with reinforced-concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

C. Provide 18 gage galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

3.4 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection size, location, and invert are as indicated on Drawings.

B. Establish elevations of buried piping with not less than 4 ft of cover.

C. Establish minimum separation of 5 ft from sanitary sewer piping in accordance with NYSBC.

D. Excavate pipe trench in accordance with Division 31.

E. Install pipe to elevation as indicated on Drawings.

F. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches loose depth; compact to 95 percent maximum density.

G. Install pipe on prepared bedding.

H. Route pipe in straight line.

I. Install pipe to allow for expansion and contraction without stressing pipe or joints.

J. Pipe Cover and Backfilling:
1. Backfill trench in accordance with Division 31.
2. Maintain optimum moisture content of fill material to attain required compaction density.
3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 6 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
5. Do not use wheeled or tracked vehicles for tamping.

3.5 FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Test domestic water piping system in accordance with local authority having jurisdiction.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Requirements for cleaning.

B. Disinfect water distribution system in accordance with Section 02516.

C. Prior to starting work, verify system is complete, flushed and clean.

D. Verify pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

E. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.

F. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.

G. Maintain disinfectant in system for 24 hours.

H. When final disinfectant residual tests less than 25 mg/L, repeat treatment.

I. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.

J. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

END OF SECTION

SECTION 221119

WATER SUPPLY ACCESSORIES

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications, dimensional data, and installation instructions for each item specified, excluding fasteners.

1.02 MAINTENANCE

A. Special Tools: Deliver to the Director's Representative.

1. Wall Hydrant T-Handle Locking Key: One for each wall hydrant.

2. Tools For Vandal Resistant Fasteners: One for each type and size.

1.03 Quality Assurance:

A. General:

1. Materials and components manufactured for potable water use shall contain no more than a weighted average of 0.25 percent lead with respect to the wetted surfaces and meet the requirements of NSF/ANSI 372, third part testing and certification.

PART 2 PRODUCTS

2.01 WATER HAMMER ARRESTORS

A. Hydro-pneumatically controlled with permanently sealed expansion chamber pre-charged with non-combustible gas, threaded connection, and conforming to ASME A112.26.1M - Water Hammer Arrestors, and ASSE 1010 - Water Hammer Arrestors.

a. Copper construction, piston type sized in accordance with PDI WH-201.

2.02 DRAIN VALVE

A. Cast brass body with renewable units, hose bibb vacuum breaker (ASSE 1011) with drainage feature, and removable cast iron hand wheel with vandal resistant fastener.

1. Valve must be completely assembled to make hose connection.

2. Connections: 3/4 inch threaded or solder end inlet, and 3/4 inch hose bibb outlet.

2.04 FASTENERS

A. Vandal Resistant Fasteners: Torx head with center pin.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

SECTION 221300

SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. ASTM B302 - Standard Specification for Thread-less Copper Pipe.

2. CISPI 301 - Standard Specification for Hub-less Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

3. CISPI 310 - Specification for Coupling for Use in Connection with Hub-less Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

B. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.2 SUBMITTALS

A. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.

2. Hangers and Supports: Submit manufacturers catalog information including load capacity.

3. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

B. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED

A. Cast Iron Soil Pipe: ASTM A74, service weight, plain ends.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: ASTM C564, rubber gasket joint devices or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hub-less, service weight.
   1. Fittings: Cast iron, CISPI 301.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Tube: ASTM B88 Type L.
   1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
   2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

D. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized.
   1. Fittings: Cast Iron, ASME B16.1, flanges and fittings; ASME B16.4, threaded fittings.
   2. Fittings: Malleable Iron, ASTM A47/A47M.
   3. Joints: Threaded for pipe 2 inch and smaller; flanged for pipe 2-1/2 inches and larger.

E. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, cut grooved ends.
   1. Fittings: ASTM A395/A395M and ASTM A536 ductile iron, or ASTM A234/A234M carbon steel, grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, hot dipped galvanized, compatible with steel piping sizes, rigid type.

b. Gasket: Elastomer composition for operating temperature range from -30 degrees F to 230 degrees F.
c. Accessories: Steel bolts, nuts, and washers.

F. PVC Pipe: ASTM D2729, polyvinyl chloride (PVC) material.
1. Fittings: ASTM D2729, PVC.
2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.3 BEDDING AND COVER MATERIALS

A. Bedding: Fill as specified in Division 31.

B. Cover: Fill as specified in Division 31.

C. Soil Backfill from Above Pipe to Finish Grade: Soil as specified in Division 31. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare piping connections to equipment with flanges or unions.

C. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection size, location, and invert are as indicated on Drawings.

B. Establish elevations of buried piping with not less than 4 ft of cover.

C. Excavate pipe trench in accordance with Division 31.

D. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches loose depth; compact to 95 percent maximum density.

E. Install pipe on prepared bedding.

F. Route pipe in straight line.

G. Install pipe to allow for expansion and contraction without stressing pipe or joints.

H. Pipe Cover and Backfilling:
1. Backfill trench in accordance with Division 31.

2. Maintain optimum moisture content of fill material to attain required compaction density.
3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 6 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
5. Do not use wheeled or tracked vehicles for tamping.

3.3 INSTALLATION – UNDER AND ABOVE GROUND PIPING

A. Establish invert elevations, slopes for drainage to 1/4 inch per foot minimum. Maintain gradients.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

G. Install piping to maintain headroom. Do not spread piping, conserve space.

H. Group piping whenever practical at common elevations.

I. Support cast iron drainage piping at every joint.

END OF SECTION

SECTION 221400

FACILITY STORM DRAINAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Storm water piping above grade.
2. Unions and flanges.
3. Pipe hangers and supports.
4. Roof drains.
5. Cleanouts.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME A112.21.2M - Roof Drains.
2. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
3. ASME B31.9 - Building Services Piping.

B. ASTM International:
1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
2. ASTM C14M - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe (Metric).
3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
4. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
5. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
6. ASTM C443M - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric).
7. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
8. ASTM C478M - Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric).
9. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

C. Cast Iron Soil Pipe Institute:
1. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

1.3 SUBMITTALS

A. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes for roof drains.

B. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
2. Hangers and Supports: Submit manufacturers catalog information including load capacity.
3. Storm Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

C. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Carpenter & Paterson Inc.
2. Creative Systems Inc.
3. Flex-Weld, Inc.
4. Glope Pipe Hanger Products Inc.
5. Jay R. Smith Mfg. Co.

B. Hangers for Pipe Sizes 2 inches (50 mm) and Larger: Carbon steel, adjustable, clevis.

2.2 ROOF DRAINS AND OVERFLOW DRAINS

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer’s products by one of the following or approved equal:
1. Jay R. Smith
2. Zurn
3. Josam
4. Substitutions: Division 01 - Product Requirements.

B. Roof Drain:
1. Assembly: ASME A112.21.2M.
2. Body: Lacquered cast iron with sump.
3. Strainer: Removable cast iron dome with vandal proof screws.
4. Accessories: Coordinate with roofing type:

a. Membrane flange and membrane clamp with integral gravel stop.
b. Adjustable under deck clamp.
c. Roof sump receiver.
d. Waterproofing flange.
e. Leveling frame.
f. Adjustable extension sleeve for roof insulation.

C. Overflow Drain:
1. Assembly: ASME A112.21.2M.
2. Body: Lacquered cast iron with sump.
3. Strainer: Removable cast iron dome with vandal proof screws.
4. Pipe extended to 3 inches above flood elevation.
5. Accessories: Coordinate with roofing type:
a. Membrane flange and membrane clamp with integral gravel stop.
b. Adjustable under deck clamp.
c. Roof sump receiver.
d. Waterproofing flange.
e. Leveling frame.
f. Adjustable extension sleeve for roof insulation.
g. Perforated stainless steel ballast guard extension.

2.3 CLEANOUTS

A. Interior Accessible Areas : Caulked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.4 BEDDING AND COVER MATERIALS

A. Bedding: Fill as specified in Division 31.

B. Cover: Fill as specified in Division 31.

C. Soil Backfill from Above Pipe to Finish Grade: Soil as specified in Division 31. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION - HANGERS AND SUPPORTS

A. Inserts:
1. Provide inserts for placement in concrete forms.

2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

B. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection size, location, and invert are as indicated on Drawings.

B. Establish elevations of buried piping with not less than 4 ft of cover.

C. Excavate pipe trench in accordance with Division 31.

D. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches loose depth; compact to 95 percent maximum density.

E. Install pipe on prepared bedding.

F. Route pipe in straight line.

G. Install pipe to allow for expansion and contraction without stressing pipe or joints.

H. Pipe Cover and Backfilling:
1. Backfill trench in accordance with Division 31.
2. Maintain optimum moisture content of fill material to attain required compaction density.
3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 6 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
5. Do not use wheeled or tracked vehicles for tamping.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Establish invert elevations, slopes for drainage to 1/8 minimum. Maintain gradients.
B. Extend cleanouts. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearance at cleanout for snaking drainage system.
C. Install non-conducting dielectric connections wherever jointing dissimilar metals.

D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
E. Install piping to maintain headroom. Group piping to conserve space.

3.5 SCHEDULES

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
Cast Iron (All Sizes)	5 (1.5)	5/8 (15)

Note for Cast Iron Pipe: Provide close to joint on barrel. Also provide hanger at each change of direction and each branch connection.

END OF SECTION

SECTION 22 33 01

DOMESTIC WATER HEATER

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each water heater.

B. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Owner.
   2. Warranty: Copy of specified warranty.

1.02 REGULATORY REQUIREMENTS

A. Water heater shall be UL listed and labeled.

B. Comply with the State Energy Conservation Construction Code.

1.03 WARRANTY

A. Manufacturer's Warranty: Three year warranty for the glass lined water heater tank.

PART 2 PRODUCTS

2.01 WATER HEATER

A. Tank: Welded steel, factory tested at 300 psi and rated for 150 psi working pressure.
   1. Glass lining permanently bonded to tank interior surface.
   2. Tank nipples factory installed.
   3. Renewable magnesium anode.
   4. Corrosion resistant dip tube.
   5. Drain and relief valve tappings.
   6. Renewable bronze boiler drain.

B. Heating Elements: Immersion type, replaceable; 75 watts per square inch maximum watt density.

C. Thermostat: Adjustable, interlocked with overheat control, including automatic shut-off.

D. Wiring: Factory interwired, requiring only a single field electric connection to put the heater into service.

E. Outer Casing: Steel with baked enamel or acrylic finish.
1. Access door for servicing thermostats and heating elements.

F. Pressure-Temperature Relief Valve: AGA Z21.22; bronze body with stainless steel internals and threaded blow-off connection.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Install the water heater on a level, firm base.

C. Install the pressure-temperature relief valve in the dedicated tank tapping. Pipe the relief valve blow-off to a point 6 inches above the floor.

D. Provide gate valves on hot and cold water connections.

E. Make final piping connections with unions.

F. Flush and fill tank. Do not switch on heating elements until tank is full and entrapped air is eliminated.

END OF SECTION

SECTION 224200

PLUMBING FIXTURES

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications, roughing dimensions, and installation instructions for each item specified except fasteners.

1. Deliver cut out data for countertop fixtures to the Owner.

B. Samples:

1. Water Closet Seat: One seat if other than product specified. Sample will be returned and if approved, may be installed on the Project.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with applicable requirements of FS WW-P-541, and the following standards:

a. ANSI/ASME A112.6.1M - Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.

b. ANSI/ASME A112.18.1M - Plumbing Fixture Fittings.

c. ANSI/ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures.

d. ANSI/ASME A112.19.2M - Vitreous China Plumbing Fixtures.

e. ANSI/ASME A112.19.6 - Hydraulic Requirements for Water Closets and Urinals.

2. Materials and installations designated as handicapped accessible shall conform with the following:

a. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.

b. The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG), (Appendix A to 28 CFR Part 36).

c. The Uniform Federal Accessibility Standards (UFAS), (Appendix A to 41 CFR Part 101-19.6).

3. Each fixture carrier support shall be listed by model number in the fixture support manufacturer's Fixture Support Selection Guide as being recommended for support of the appropriate fixture.

B. Plainly and permanently mark each fixture and fitting with the manufacturer's name or trade mark.

1.03 MAINTENANCE

A. Special Tools: Deliver to the Owner.

1. Furnish the following tools labeled with names and locations where used.

a. Keys for stops (furnished with stops).

b. Tools for Vandal Resistant Fasteners: Two for each type and size.

PART 2 PRODUCTS

2.01 MATERIALS - GENERAL

A. Vitreous China: First quality, smooth, uniform color and texture, with fused on glaze covering surfaces exposed to view.

1. Surfaces shall be free of chips, craze, warpage, cracks and discolorations. Surfaces in contact with walls or floors shall be flat, with warpage not to exceed 1/16 inch per foot.

2. Color: White.

B. Porcelain Enameled Cast Iron: Smooth, uniform color and texture, having fused on glaze covering surfaces exposed to view.

1. Material shall show no cracks, chips, craze or discolorations.

2. Enameled surfaces shall be acid resistant unless otherwise specified.

3. Color: White.

C. Fixture Trim: Brass, bronze, or stainless steel construction; consisting of supply and waste fittings, faucets, traps, stop valves, escutcheons, sink strainers, nipples, supplies, and metal trim.

1. Brass piping: Ips standard weight, with standard weight, 125 lb cast brass fittings.

3. Brass tubing: 18 B & S gage.

3. Stainless steel: 18-8 Type 302 or 304 unless otherwise specified.

C. Fixture Trim Finishes:

1. Brass or Bronze: Polished or satin finished chrome plating, 0.02 mil chromium over 0.2 mil nickel plating.

2. Stainless Steel: Invisible welds and seams, and unless otherwise specified, polished to No. 4 commercial finish.

D. Fixture Hold-down Bolts: Steel, plated for corrosion resistance.

1. Cap nuts: Metal, polished and chrome plated.

F. Combination Faucets: Faucets shall turn counter to each other for the on and off positions.

G. Vandal Resistant Fasteners: Torx head with center pin.

2.02 TYPE P-2 LAVATORY

A. Fixture: Vitreous china, unitized construction, straight front and sides, flat top graded to bowl, cast-in soap dish, anti-splash rim and front overflow; designed for concealed arm supports.

1. Dimensions: 20 inches long, 18 inches front to back, 3-1/2 inches front and side apron.

2. 4 inch high integral back.

B. Supply Fitting: Individual deck mounted, electronic automatic metering faucet:

1. Maximum Flow: 0.5 gpm. at 80 psi.

a. Exception: Metering faucets shall have a maximum flow of 0.25 gallons per cycle.

2. Over rim spout with aerator.

3. Renewable operating units.

4. Vandal resistant assembly.

5. 1/2 inch inlet lock nut and coupling nut.

C. Waste Fitting: Pop-up type, actuated by a lift knob on the back ledge.

1. Metal drain plug.

2. Solid metal lift knob and cast escutcheon.

3. 1-1/4 inch tailpiece.

4. Vandal resistant assembly.

D. Trap: Cast brass, non-adjustable P trap, 1-1/4 inch tubing inlet, 1-1/2 inch ips. outlet.

1. Bottom cleanout plug.

2. Ips brass nipple with solid cast brass escutcheon.

E. Supplies: 3/8 inch ips. brass with key operated stops and solid cast brass escutcheons.

1. Wall Supplies: Angle stops with keys.
2. Floor Supplies: Straight stops with keys.

F. Faucet Hole Cover: Cast brass, rounded top, and threaded shank, with backing plate, lock washer and nut.

2.03 TYPE P-2A LAVATORY, HC

A. Fixture: Vitreous china, unitized construction, straight front and sides, flat top graded to bowl, cast-in soap dish, anti-splash rim and front overflow; designed for concealed arm supports.

1. Dimensions: 20 inches long, 18 inches front to back, 3-1/2 inch front and side apron.

2. 4 inch high integral back.

B. Supply Fitting: Individual deck mounted, electronic automatic metering faucet:
1. Maximum Flow: 0.5 gpm at 80 psi.

a. Exception: Metering faucets shall have a maximum flow of 0.25 gallons per cycle.

2. Over rim spout with aerator.

3. Renewable operating units.

4. Vandal resistant assembly.

5. 1/2 inch inlet lock nut and coupling nut.

C. Waste Fitting: 1-1/4 inch tailpiece with cast brass flat perforated strainer grate.

D. Trap: Cast brass, non-adjustable P trap, 1-1/4 inch tubing inlet, 1-1/2 inch ips outlet.

1. Bottom cleanout plug.

2. Ips brass nipple with solid cast brass escutcheon.

E. Supplies: 3/8 inch ips brass with key operated stops and solid cast brass escutcheons.

1. Wall Supplies: Angle stops with keys.

2. Floor Supplies: Straight stops with keys.

G. Faucet Hole Cover: Cast brass, rounded top, and threaded shank, with backing plate, lock washer and nut.

2.04 FIXTURE SUPPORTS AND SUPPORTING DEVICES FOR LAVATORIES, SINKS, AND EQUIPMENT

A. General: Ferrous metal members of carriers and supporting devices with the exception of chrome plated or porcelain enameled cast iron, shall be factory painted for corrosion resistance.

B. Wall Mounted Carrier Supports: Plate type system, with steel plates on both sides of the wall and through-bolted. On walls having an integral finish, a single plate wall carrier designed for such installations may be used. Each carrier shall be provided with the appropriate fixture supporting devices specified, or recommended by the Carrier manufacturer's Fixture Support Selection Guide.

1. Concealed Arms: Steel, with fixture locking lugs, leveling screws and a means of attaching, positioning and securing the fixture to the carrier.

a. Trim: Polished, Chrome plated metal escutcheon to space fixture two inches from the wall.

C. Wood Stud Filler Piece: 2 inch x 8 inch wood planking cut to fit between wood studding. Fasten with four 3/8 inch x 2-1/2 inch lag bolts with washers.

2.05 VITREOUS CHINA WATER CLOSETS

A. Fixtures: Vitreous china, full size, elongated bowl with integral flushing rim and jet; trapway at the rear and the outlet centered between a pair of hold down bolt holes.

1. Trap-way size: Pass minimum ball of 2 inches.

2. Trap seal: 2 inches minimum.

3. Water surface area: 12 inches x 10 inches minimum.

4. Provisions for flushing:

a. 1-1/2 inch top spud for flush valve operation.

5. Wall Supported Fixture Heights:

a. Standard Fixture: 14 to 15 inches from finished floor to rim.

b. Handicapped Accessible Fixture: 17 to 19 inches from finished floor to top of seat (15-13/16 to 17-13/16 inches from finished floor to top of rim based on 1-3/16 inch seat height).

B. Operation: Fixture shall flush satisfactorily without extraordinary rise of water level in the bowl.

1. Maximum gallons of water per flush: 1.28 gallons.

C. Water Closet Wall Flange:

1. For Use with DWV Copper Tubing: Cast brass, 48 ounce minimum weight.

2. For Use with Cast Iron Soil Pipe: Cast iron, 90 ounce minimum weight.

C. Closet Seat: Extra heavy duty, commercial design; Model 1655-C by Bemis Mfg. Co., Model No. 527-CH by Beneke Corp., or Model No. 9500C by Church Seat Co.

1. Material and Construction: Solid plastic, open front, less cover, molded in one piece with no joints, seams or crevices.

2. The manufacturer's name shall be molded into the seat.

3. Metal check hinges shall be integrally molded into the seat. Hinges, inserts, bearings and posts shall be of brass or stainless steel. Cover upper post and metal exposed above fixture rim with plastic to match seat.

4. Surface shall be hard, polished, impervious to moisture, and not affected by the action of uric acid.

5. Color: White.

D. Water Closet Types:

1. Type 1 & 1A Water Closet: Wall supported, rear outlet, top spud inlet, siphon jet action, activated by an exposed flush valve.

2.06 FLUSH VALVES

A. Control Mechanism: Diaphragm or piston operated; do not intermix types.

A. Maximum Flow Per Flush:

1. Water Closet: 1.1/1.6 gallons dual flush.

C. Flush Valve Assemblies: Flush valve, stop-check, tailpiece, vacuum breaker, and fixture spud coupling, including wall and spud flanges.

D. Valve Materials:

1. Valve Body: Brass or bronze.

2. Valve Internal Parts: Corrosion resistant materials that will not be affected by the action of or contact with water.

E. Operating Features:

1. Valve operators shall employ the non-hold open feature.

2. Piston type valves shall be field adjustable.

F. Valve Operators:

1. Automatic, electronic with dual flush mode selection. Sloan ECOS or approved equal.

G. Assembly Components:

1. Flush Pipe: Seamless brass tubing with integral vacuum breaker, No. 18 B & S gage.

2. Fitting: Cast brass.

3. Stop-Check: Brass or bronze body, non rising stem stop valve with a built-in automatic check.

a. Exposed Stop-Check: Screwdriver operated with protective cap.

b. Concealed Stop-Check: Wheel handle operated.

4. Spud Coupling and Wall Flanges: Cast brass.

PART 3 EXECUTION

3.01 FIXTURE SUPPORT AND SUPPORTING DEVICE INSTALLATION

A. Install heavy duty floor mounted carrier supports with specified fixture supporting devices for wall type plumbing fixtures.

1. Secure to building construction with lag bolts and metal expansion shields, or other appropriate means as required by the construction encountered.

B. Fixture Supporting Devices: Attach fixtures by means of the following fixture supporting devices attached to carrier supports.

FIXTURE	SUPPORTING DEVICE
Lavatory, P2 & P2A	Concealed arms.
Water Closet	Bolt to comb. carrier and drainage fitting.

3.02 FIXTURE INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions.

B. Install fixtures level and at proper height, tighten connections, and install hold-down bolts, cap nuts and cover plates, where required.

C. Lavatories:

1. Mount lavatories 31 inches from finished floor to rim unless otherwise specified.

2. Mount handicapped accessible fixtures 34 inches from finished floor to rim. Refer to Standard Drawing No. 93/S3013 bound herein, for special clearances required for handicapped accessible fixtures.
   d. Caulk perimeter of fixture; strike a neat joint.

D. Water Closets:

1. Wall Supported Fixtures:

   a. Set fixture in bed of setting compound; remove excess.

2. After connections are tightened, install cap nuts and washers.

3. Install water closet seats when directed.

   a. Caulk perimeter of fixture; strike a neat joint.

E. Flush Valves:

1. Standard Fixtures: Install flush valves on fixture centerline, and at following heights above fixture rim or back to centerline of water inlet to flush valve.

   a. Water Closet: 11-1/2 inches.

2. Handicapped Accessible Fixtures: Install flush valves on fixture centerline, and at following height above finished floor to centerline of flush valve operator. Distance between centerline of flush valve operator and centerline of water inlet is 1-1/2 inches.

   a. Water Closet: Approximately 31-1/2 inches, and mounted on wide side of stall.

      1) Coordinate mounting height with Construction Work Contractor to avoid interference with grab bar, and to facilitate flush valve servicing.

3. Slip joints in flush pipe connections allowed only at fixture spud and vacuum breaker ends; others shall be screwed connections.

4. Score tubing ends before assembling to assure tight slip joint connections. No score marks shall be visible after assembly.

5. In utility corridors, solder screwed flush pipe connections.

3.03 LAVATORY INSULATION KIT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
   1. TRU-BRO Inc.
   2. McGuire Manufacturers.
   3. SKAL-Guard.
   4. Substitutions: Section 016000 - Product Requirements.

B. Product Description: Where Lavatories are noted to be insulated for ADA compliance, furnish the following: Safety Covers conforming to ANSI A177.1 and consisting of insulation kit of molded closed cell vinyl construction, 3/16 inch thick, white color, for insulating tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers.

3.04 CLEANING, FLUSHING AND ADJUSTMENT

A. Clean fixture and trim. Remove grease and dirt; polish surfaces but leave stickers and warning labels intact.

B. Flush supply piping and traps; clean strainers.

C. Adjust stops for proper delivery.

D. Adjust metering faucets for proper timing.

END OF SECTION

SECTION 230009
MECHANICAL SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of Work

Removal and demolition of selected items from selected areas of the building as indicated on the Drawings and as required to complete the Work.

1.02 SUBMITTALS

A. Submit a schedule indicating proposed methods and sequence of operations for selective removals and demolition Work, prior to commencement of operations. The sequence of operations shall be planned, in detail, to ensure uninterrupted progress of school sessions.

B. Submit details and procedures for dust and noise control.

C. Signed receipt for salvaged items delivered to the Owner.

D. Quality Control Submittals

1. Contractor Qualifications

a. Provide proof of Contractor and Professional Engineer qualifications specified under “Quality Assurance”.

b. Provide proof of Refrigerant Recovery Technician qualifications

E. Sustainability Submittals

1. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

2. Statement of the measures taken to reduce air with dust and particulate matter.

1.04 RESPONSIBILITY, PROTECTION, DAMAGES, RESTRICTIONS

A. Condition of Space

The Owner assumes no responsibility for actual condition of the space in which removals and demolition Work is performed.

B. Protections

Provide temporary barricades and other forms of protection required to protect property, personnel, students and general public from injury due to selective removals and demolition work.

1. Provide protective measures as required to provide free and safe passage of students, school personnel, and the general public.

2. Protect from damage existing finish work that is to remain in place and which becomes exposed during operations.

3. Protect floors with building paper or other suitable covering.

C. Damages

Promptly repair any and all damages to all property and finishes caused by the removals and demolition work; to the Owner's satisfaction and at no extra cost to the Owner.

D. Explosives

The use of explosives is prohibited.

E. Power-driven Tools (for interior removals and demolition).

Only hand-held electric power-driven tools conforming to the following criteria shall be used to cut or drill concrete and masonry:

1. Electric Chiselling Hammer

   a. Power Data 115 Volts AC
   7-8 Amps
   Three-wire grounded connection

   b. Percussion 2400-2600 Impacts/Minute

   c. Type/Size Hand-held (+ 18-inch length)

   d. Unit Weight 12-15 pounds (minus chisel bit)

2. Electric Hammer Drill

   a. Power Data 115 Volts AC
   5-8 Amps
   Three-wire grounded connection

   b. Percussion 2400-3200 Impacts/Minute

   c. Type/Size Hand-held (+ 18-inch length)

   d. Unit Weight 12-15 pounds (minus chisel bit)

e. Speed Data 0-0500 RPM (Under load)

1.05 QUALITY ASSURANCE

A. Qualifications

1. Company specializing in performing the Work of this Section shall have a minimum of 3 years experience and shall have worked on 3 projects of similar size.

2. Preparation of details of shoring and bracing and underpinning shall be under the direct supervision of and bear the seal of a Licensed Professional Engineer of the State of New York experienced in the design of such work, who shall also be responsible for construction supervision of such.

3. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements

1. Work of this Section shall conform to all requirements of the NYS Building Code and all applicable regulations and guidelines of all governmental authorities having jurisdiction, including, but not limited to, safety, health, and anti-pollution regulations. Where more stringent requirements than those contained in the Building Code or other applicable regulations are given in this Section, the requirements of this Section shall govern.

2. Conform to the requirements of "Safety and Health Standards, Subpart P - Excavations, Trenching and Shoring" - OSHA.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to commencement of the selective removals and demolition Work, inspect the areas in which the Work will be performed. Determine and list the existing conditions of rooms or area surfaces and equipment. After the Work in each respective area is completed, determine if adjacent surfaces or equipment have been damaged as a result of the Work; if so, the damage shall be corrected at the Contractor's expense.

3.02 REMOVALS AND DEMOLITION WORK

A. Perform selective demolition Work in a systematic manner and use such methods as are required to complete the Work indicated, and in accordance with the Specifications and governing City, State, and Federal regulations.

B. When walls, partitions, floors, and ceilings (or portions thereof) are indicated to be removed; unless indicated otherwise:

1. Remove all items attached to the surfaces of the construction to be removed.

2. Remove all plumbing piping, fixtures, accessories and rough-in occurring on or in the construction to be removed; cap piping and/or re-route lines as indicated or required.

3. Remove all connectors, piping, ductwork and other HVAC items and accessories occurring on or in the construction to be removed; cap and/or re-route piping and ductwork as indicated or required.

4. Remove all electrical wiring, to include, but not limited to, lighting, communications, alarms and all related appurtenances, conduits, devices, fixtures, and other electrical items and accessories occurring on or in the construction to be removed; disconnect power and remove wiring and conduit back to source.

C. Carefully remove items, equipment and materials to be retained by the Owner and deliver them to locations indicated in the Article titled "Ownership of Materials".

3.03 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from the removals and demolitions from the building immediately; transport and legally dispose of materials off-site. Disposal method shall be in accordance with City, State, and Federal regulations. Items to be retained by the Owner shall be delivered to locations indicated in the Article titled "Ownership of Materials".

B. Burning of removed materials is not permitted on the job site.

3.04 CLEAN-UP AND REPAIR

A. Upon completion of removals and demolition Work, remove tools, equipment and all remaining demolished materials from the site.

B. Repair all damaged areas caused by the removals and demolition Work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

C. All areas in which Work was performed under this Section shall be left "broom-clean."

3.05 OWNERSHIP OF MATERIALS

A. All equipment, materials, and items removed shall remain the property of the Owner, if desired; equipment, material and items not desired to be re-used or retained by the Owner shall be removed from the site by the Contractor. The Owner will designate which equipment, materials and items will be retained.

END OF SECTION

SECTION 230523 - VALVES

PART 1 GENERAL

1.01 ABBREVIATIONS

A. IBBM: Iron body, bronze mounted.

B. OS&Y: Outside screw and yoke.

C. WOG: Water, oil, gas.

D. WSP: Working steam pressure.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each valve type.

B. Valve Schedule: List type of valve, manufacturer’s model number, and size for each service application.

C. Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.04 MAINTENANCE

A. Special Tools:
1. One wrench for each type and size wrench operated plug valve.
2. Two insert changing tools, and one spare insert for each self contained thermostatic radiator control valve.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.

B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.

C. Valve parts of same manufacturer, size and type shall be interchangeable.

D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.

E. Manually operated valves shall open in a counterclockwise direction by means of round ventilated type handwheels.
   1. Exception: Cross handle type handwheels are acceptable for valves up to 3 inches in size.

F. In open position, wedge and stem of gate valves shall clear the waterway completely.

G. Valves which use packing shall be capable of being packed when wide open and under full working pressure.

H. Size valves the same size as the piping in which they are installed, unless otherwise specified.

I. Provide manually operated gate and globe valves 8 inches in size and larger with valved by-pass incorporated in body of main valve when installed in piping systems operating at a pressure in excess of 125 psig WSP and as shown on the drawings. Service rating of by-pass valve shall be equal to or greater than main valve it is by-passing.
   1. Exception: Stop-check valves.

2.02 MATERIALS

A. Body:
   1. Cast Iron: ASTM A 126 66, Class B, higher strength cast iron.
   2. Bronze: For use up to 150 psig WSP, ASTM B 62 and over 150 psig to 300 psig WSP, ASTM B 61.
   3. Cast Steel: ASTM A 216 Grade WCB.
   4. Forged Steel: ASTM A 105 Grade 2.

B. Stem:
   1. Cast Manganese Bronze: ASTM B 584.
   2. Cast Silicon Brass: ASTM B 584.
   3. Rolled Silicon Brass: ASTM B 98 Alloy D.
   4. Rolled Aluminum Bronze: ASTM B 150 Alloy 1.
   5. Rolled Manganese Bronze: ASTM B 138 Alloy A (half hard).
   6. Naval Brass: ASTM B 21 Alloy A or Alloy C (hard).
   7. Carbon Steel: As specified for particular type of valve.
   8. Stainless Steel: As specified for particular type of valve.

C. Trim: As specified for particular type of valve.

2.03 GATE VALVES

A. Type A: 125 psig WSP, 200 psig WOG, bronze body, union bonnet, solid wedge disc, and threaded ends. Acceptable Valves: Crane428UB, Hammond IB617, Jenkins 47CU, Milwaukee 1152, Nibco T134, and Stockham B105.

B. Type C: 125 psig WSP, 200 psig WOG up to 12 inch size, and 150 psig WOG for 14 inch and 16 inch sizes; IBBM OS&Y, bolted bonnet, solid wedge disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 464-1/2

& 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco T6170 & F6170, and Stockham G620 & G623

C. Type D: 125 psig WSP, 200 psig WOG, bronze body, threaded bonnet, solid wedge disc, and solder ends. Acceptable Valves: Crane 1330, Hammond IB635, Jenkins 991AJ, Milwaukee 149, Nibco S111, and Stockham B108.

D. Type E: 200 psig WSP, 400 psig WOG, bronze body, union or bolted bonnet, solid wedge disc, with monel, cupro-nickel alloy or stainless steel seat rings, and threaded ends. Acceptable Valves: Crane 424, Hammond IB650, Jenkins 2270UJ, Milwaukee 1174, Nibco T174SS, and Stockham B132.

E. Type G: 300 psig WSP, 600 psig WOG, bronze body, union or bolted bonnet, solid wedge disc, cupro-nickel alloy or stainless steel seat rings, and threaded ends. Acceptable Valves: Crane 634E, Hammond IB658, Jenkins 2280UJ, Milwaukee 1184, Nibco T174SS, and Stockham B145.

2.04 GLOBE AND ANGLE VALVES

A. Type J: 125 WSP, 200 psig WOG, bronze body, threaded bonnet, and threaded ends. Acceptable Valves: Crane 1, Hammond IB440 & IB463, Jenkins 101J, Milwaukee 502, Nibco T211 & T311, and Stockham B16.

B. Type K: 125 psig WSP, 200 psig WOG, IBBM OS&Y, bolted bonnet, and threaded or flanged ends depending on size. Acceptable Valves: Crane 351 & 353, Hammond IR116, Jenkins 613C & 615C, Milwaukee F2981, Nibco F718B & F818B, and Stockham G512, & G515.

C. Type M: 250 psig WSP, 500 psig WOG, IBBM OS&Y, bolted bonnet, renewable seat and disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 21E, Hammond IR313, Jenkins 923C, Milwaukee F2983, Nibco F768B & F869B, and Stockham F532.

D. Type N: 300 psig WSP, 600 psig WOG, bronze body, union bonnet, with 500 Brinell hardness stainless steel renewable plug, 500 Brinell hardness stainless steel replaceable seat ring, and threaded or flanged ends depending on size. Acceptable Valves: Crane 382P & 384P, Hammond IB444, Jenkins 556P & 558P, Milwaukee 593A, Nibco T276AP & T376AP, and Stockham B74 & B274.

E. Type O: 125 psig, 200 psig WOG, bronze body, threaded bonnet, and solder ends. Acceptable Valves: Crane 1310, Hammond IB423, Jenkins 1200C, Milwaukee 1502, Nibco S211, and Stockham B17.

2.05 CHECK VALVES

A. Type S: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 37, Hammond IB940, Jenkins 4092, Milwaukee 509, Nibco T413Y, and Stockham B319Y.

B. Type T: 150 psig WSP, 300 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with Buna-N or teflon. Acceptable Valves: Crane 137, Hammond IB944, Jenkins 4092 & 4037J, Nibco T4331, and Stockham B321.

C. Type U: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and solder ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 1340, Hammond IB912, Jenkins 4093, Milwaukee 1509, Nibco S413Y, and Stockham 309Y.

D. Type V: 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.

E. Type W:
   1. Globe Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
      a. Acceptable Valves (125 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 20D, Hammond IR9354, Milwaukee 1800, Nibco F910, and Williams Hager 636.
      b. Acceptable Valves (250 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 21D, Milwaukee 1800, Nibco F960, and Williams Hager 636.
   2. Wafer Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
      a. Acceptable Valves (125 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 10D, Hammond IR9253, Milwaukee 1400, Nibco W910, and Williams Hager 329 & 375.
      b. Acceptable Valves (250 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 11D, Milwaukee 1400, Nibco W960, and Williams Hager 329 & 375.

F. Type X: 300 WSP, 600 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face disc for cold water service with Buna-N or teflon. Acceptable Valves: Crane 76E, Hammond IB949, Jenkins 4962J, Milwaukee 507, Nibco T4731, and Stockham B375.

G. Type Y: 250 psig WSP, 500 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 39E, Hammond IR322, Jenkins 339C, Milwaukee F2970, Nibco F968B, and Stockham F947.

H. Type Z: 125 psig flange pressure rating, cast iron body, wafer style, split clapper plate type with integral body seat ring, plain or flat face end connections, resilient Buna-N seal vulcanized to body seat ring; aluminum, bronze or stainless steel

clapper plates; Type 316 stainless steel clapper springs and hinge pins; and nickel plated steel or stainless steel stop pieces. Acceptable Valves: Apco Series 9000, Nibco W920W, Stockham WG970, and Marlin Duo-Check II.

2.06 PLUG VALVES

A. Type AA: 200 psig WOG, lubricated type with standard port opening, cast iron or semi-steel body, sealed lubrication system with lubricant fitting and dial indicator, cylindrical plug or teflon tapered plug, lubricant grooves in body or plug, threaded or flanged ends depending on size, and capable of lubrication with valve under pressure and plug in any position.
   1. Acceptable Valves:
      a. 1/2 inch to 3 inch size: Homestead 611 & 612, Resun R1430 & R1431, and Rockwell 142 & 143.
      b. 4 inch size: Homestead 611 & 612, , Resun R1430 & R1431, and Rockwell 142 & 143.
      c. 5 inch size: Homestead 611 & 612, Resun R1431, and Rockwell 143.
      d. 6 inch size: Homestead 611 & 612, , Resun R1431, and Rockwell 143.
      e. 8, 10 & 12 inch sizes: Homestead 612G, Resun R1431WGA, and Rockwell 149.
   2. Operators:
      a. 6 inch size and Less: Wrench operator.
      b. 8 inch size and Up: Worm gear operator.

B. Type AB: 100 psig WOG, gas cock type with cast iron or bronze body, bronze plug, square head, wrench operator, and threaded ends. Acceptable Manufacturers: Crane, Eclipse Combustion, and McDonald.

2.07 BUTTERFLY VALVES

A. Type BF: Iron body, flangeless wafer or lugged type, (lug for each bolt hole, drilled and tapped for cap screws), with replaceable reinforced resilient EPT (EPDM) seats, bronze or nickel plated ductile iron discs, phosphate coated steel or stainless steel stems, and raised necks able to accommodate 2 inches of insulation. Acceptable Manufacturers: Crane, Demco, De Zurik, Hammond, Keystone, Milwaukee, Nibco, Stockham, and Watts.
   1. Pressure Ratings:
      a. 12 inch size and Less: 200 psig WOG at 275 degrees F.
      b. 14 inch size and Up: 150 psig WOG at 275 degrees F.

B. Type BF-HP: ANSI Class 150 lug style carbon steel body, stainless steel disc and stem, RTFE seats and bushings. Acceptable Manufacturers: Crane, Hammond, Keystone, Milwaukee, and Stockham.

C. Operators:
   1. 6 inch size and Less: Manual actuator handles with external indication of disc position, and suitable means of locking actuator in any fixed position.
   2. 8 inch size and Up: Worm gear operator.

2.08 COMBINATION BALANCING AND SHUT-OFF VALVES

A. Heavy duty brass construction of angle or straightway pattern with 200 psig working water pressure at 250 degrees F, one union connection and one threaded or solder end, visible graduated dial indicator, memory stop, and wheel handle with full turn opening. Acceptable Manufacturers: Dunham-Bush, and Spirax Sarco.

2.09 REFRIGERANT VALVES

A. Type BVR Refrigerant ball valve: Full port, hermetically welded, forged brass with copper tube extensions intended for use with refrigerants specified, teflon seats, polished brass ball, teflon seals, and flared or brazed ends. 500 psig CWP, UL listed. Provide with access fitting. Acceptable Manufacturers: Mitsubishi, Daikin, Apollo 79 series, or equal.

2.10 WATER PRESSURE REDUCING VALVES

A. Cold Water Make-Up Service:
   1. Adjustable direct acting, spring loaded, diaphragm operated, single seat type conforming to ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Supply Systems. Acceptable Manufacturers: Bell & Gossett, Watts, and Wilkins.
      a. Body: Brass or bronze construction.
      b. Wetted Parts: Brass, bronze, stainless steel, or nickel alloy construction.
      c. Renewable seat and removable composition disc.
      d. Integral low inlet pressure check valve.
      e. Operating Temperature Range: 33-160 degrees F.
      f. Maximum Working Pressure: 125 psi.
   2. Pressure reducing valves with integral strainers may be substituted for approval, in lieu of separate valve and strainer, if integral strainer and valve meet individual valve and strainer specifications.

2.12 NEEDLE STOP VALVES

A. For Temperatures to 300 degrees F.: All brass or forged carbon steel construction, union bonnet, screwed ends, built for 1000 psi at 300 degrees F.

B. For Temperature in Excess of 300 degrees F.: Carbon steel bar stock bodies, stainless steel stems, screwed ends, built for 4,500 psi at 450 degrees F.

C. For Use In High Temperature Water Piping: Carbon steel bar stock or forged steel bodies, stainless steel stems, screwed ends, built for 4,500 psi at 450 degrees F.

D. Acceptable Manufacturers: Marsh Instrument Company, Singer-American Meter Division, H.O. Trerice Co. and Weksler Instruments Corp.

2.13 GAGE COCKS

A. Gage Cocks: All brass construction, "T" or lever handles, screwed ends, built for 300 psig hydraulic pressure. Acceptable Manufacturers: Marsh Instrument Company, Mueller Instruments Co., H.O. Trerice Co. and Weksler Instruments Corp.

2.14 GROOVED END VALVES

A. Valves shall be of type, material and pressure rating, as required by the particular application, as approved.

2.15 VACUUM RELIEF VALVES

A. For Use With Water: Watts Regulator Co. No. N36.

2.16 BALL VALVES

A. Type BV: 150 psig WSP, 600 psig WOG, 2-piece full port, bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips and threaded, solder, or press-fit ends. Acceptable Manufacturers: Apollo, Hammond, Milwaukee, Nibco, and Watts.
1. Valve Option: Extended Stem.
2. Ball Valves for Press-fit Copper Fittings shall be two-piece bronze or brass body with full port, chrome or brass plated ball, blow-out proof stem and PTFE or RTFE seats, rated at 250 psi minimum with press fitting ends. Ball Valves shall be Viega Model 2970.10, NIBCO PC585-70; Apollo Valves 77W-140 Series or Jomar Valve JP-100. Ball valves shall have a metal lever handle.

2.17 SELF CONTAINED THERMOSTATIC RADIATOR CONTROL VALVE

A. Type: NPT Nickel-plated forged brass body with union outlet, EPDM disc, stainless steel spindle, replaceable insert, actuators capable of being changed without draining the system, valve mounted setting knob and remote temperature sensor (46 - 80 Degree F range), brass sensor with sensor guard, stainless steel capillary tube, fully automatic- non electric, long term tested to 5000 cycles (1.3 Degree F).
1. Pressure Ratings:
   a. Maximum WaterTemperature: 250 degrees F.
   b. Maximum Steam Pressure: 15 psig.
   c. Max. Static Pressure: 145 psi
   d. Max. Differential Pressure: 20 psi (Sized for 5 psi pressure drop at design flow)
2. Valve Coefficients (Cv):
   a. 1/2 inch body size: 1.8
   b. 3/4 inch body size: 2.5
   c. 1 inch body size: 2.74
   d. 1-1/4 inch body size: 5.0

B. Acceptable Manufacturer: MACON CONTROLS, 118 Exchange Street, Chicopee, MA, 01013, (413) 594-8695.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install valves at locations noted on the drawings or specified. In addition, comply with the following requirements:

1. Install valves where required for proper operation of piping and equipment including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Non-rising stem valves shall be used only where headroom prevents full extension of rising stems. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.

3. Install gate valves for shut-off; to isolate equipment, parts of systems, and vertical risers and any banked system of coils and to separate each coil.

4. Hose gate valves: Provide hose gate valves to drain the pipe at the low points of the system.

5. Install globe for throttling service and control device.

6. Provide 1" gate vent valves at all high points in the piping system.

7. Provide lift check valves at the discharge of all pumps as shown on the Drawings.

8. Outside Screw and Yoke Type: Gate valves in lines leading from the boilers to the boiler steam header, in boiler blow-off lines, and at other points so specified or shown on the drawings shall have outside screw and yoke (OS&Y) with bronze rising stem.

B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

C. Mechanical Actuators: Install mechanical actuators with chain operators where indicated on the drawings and wherever valves are installed more than 8’-0” above the floor (except for valves concealed above ceilings). Extend chains to about 5'-6" above the floor and hook to clips to clear aisle passage or provide chain buckets (Babbitt Bucket or equal).

D. Shutoff valves shall be installed on the supply and return side of all heat exchangers.

E. Shutoff valves shall be installed on the building supply and return of central utility systems and district heating and cooling systems.

F. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

G. Shutoff valves shall be installed on connections to mechanical equipment and appliances.

3.02 MANUAL CONTROL VALVES FOR DIRECT RADIATION

A. Provide manually operated valve for each cast iron radiator, convector or finned type radiator. Do not install manually operated valves on any standing radiation, which is provided with an individual automatic temperature control valve.

B. Hot Water Application:
   1. Install globe, angle or straight-way type radiator valves for all hot water radiation. Where a regular globe or angle type valve cannot be used, install an offset body globe or offset corner pattern valve. Size valve full size of supply run out serving each heating unit.
   2. Install balancing fittings, full size of runouts, on all standing hot water radiation, whether or not provided with an automatic temperature control valve. Install balancing fittings in the returns only, of radiation installed in series.

3.03 DISCHARGE PIPING FROM LIQUID RELIEF VALVES

A. Connection vent piping to the discharge outlet of all relief valves and terminate over floor drain, bell outlet or other approved point of waste.

3.04 VALVE APPLICATION SCHEDULE

A. Schedule of valve applications for the different services is as follows:

   1. Chilled Water (CWS & CWR) 125 psig and less:
      a. 3 inches and Less: Screwed, solder, or press-fit ends, A or D gates or BV balls, J or 0 globe or angles and S or U checks.
      b. 4 inches and Up: Flanged end, C gates or BF butterflies, K globe or angles and V checks.
   2. Condensate Returns (LPR & MPR) 125 psig and less:
      a. 2 inches and Less: Screwed end, A gates, J globe or angles and S checks.
      b. 2-1/2 inches and Up: Flanged end, C gates, K globe or angles and V checks.
   3. Condenser Water (CF & CR) 125 psig and less:
      a. 3 inches and Less: Screwed, solder, or press-fit ends, A or D gates or BV balls, J or 0 globe or angles and S or U checks.
      b. 4 inches and Up: Flanged end, C gates or BF butterflies, K globe or angles and V checks.
   4. Hot Water (HWS & HWR) 125 psig and less:

a. 3 inches and Less: Screwed, solder, or press-fit ends, A or D gates or BV balls, J or 0 globe or angles and S or U checks.
b. 4 inches and Up: Flanged end, C gates or BF butterflies, K globe or angles and S checks.

5. Refrigerants - 700 psig and less, Up to 3 1/8 inches O.D.: Brazed or flared end BVR ball valve.

END OF SECTION

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SECTION 230529 - PIPE HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Shop Drawings:

1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
2. Details of pipe anchors.

B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.

1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
UP to 2-1/2	4	16	6	10
3 to 6	4	14	6	10
8 to 14	10	12	12	16
16 and up	10	10	12	16

B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16
10 to 14	12	12
16 and up	18	10

C. Pipe covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support. - **DELETE WHEN HOT SERVICE INSULATION IS NOT SPECIFIED**.

PIPE SIZE (Inches)	SADDLE LENGTH (Inches)	SADDLE GAGE
8" and up	12"	7 (3/16")

D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches IPS and larger.

1. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.

E. Adjustable Floor Rests and Base Flanges: Steel

F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

G. Riser Clamps: Malleable iron or steel.

H. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, 2-1/2 to 20 inches, from single rod if horizontal movement caused by expansion and contraction might occur.

I. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, 2 to 30 inches, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction

J. Restraints, Anchors, and Supports for Grooved End Piping Systems: As recommended by the grooved end fitting manufacturer.

K. Foam Insulated Pipe Hanger: Single-piece thermally insulated pipe hanger with self-adhesive closure. CFC-free PET load-bearing segments embedded in closed cell insulation with outer shell of 30-mil thick painted aluminum.

2.02 FASTENERS

A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN1405, HN-1614, FS-1411 Series. - **ALSO AVAILABLE STAINLESS STEEL.**

B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS-3822. - **ALSO AVAILABLE GALVANIZED AND STAINLESS STEEL.**

C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips Series S-14.

D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.

E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS-38 Series.

F. Continuous Slotted Type Concrete Insert, Galvanized:

1. Load Rating 800 lbs/ft: Kindorf's D-986.
2. Load Rating 1500 lbs/ft: Kindorf's D-980.
3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.
4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.

G. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch dia machine bolts.

H. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch dia bolts having special wedge shaped heads.

I. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.03 SHOP PAINTING AND PLATING

A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with zinc chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.

B. Hanger supports for chromium plated pipe shall be chromium plated brass.

PART 3 - EXECUTION

3.01 PREPARATORY WORK

A. Place inserts into construction form work expeditiously, so as not to delay the work.

3.02 INSTALLATION

A. Do not hang or support one pipe from another or from ductwork.

B. Support all insulated horizontal piping by means of hangers or supports with insulation shields installed outside of the insulation.

C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.

1. For Steel, Alloy Steel, and Fibrous glass Reinforced Plastic Pipe (FRP):

Pipe Size (Inches)	Maximum Spacing (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and over	12

2. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
3/4 and under	5
1-1/4	6
1-1/2 and over	8

3. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
4. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
5. For Branch Piping Runs and Runouts over 5 Feet in Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
6. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.

D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	Pipe	Tubing	Pipe	Tubing
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	½	3/8	3/8	1/4
4 and 5	5/8	1/2	1/2	3/8
6	¾	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

1. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 10 feet on copper pipe and 15 feet on steel pipe, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps. - **DELETE WHEN COLD SERVICE INSULATION IS NOT REQUIRED.**

F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

3.03 UPPER HANGER ATTACHMENTS

A. General:

1. Do not use drive-on beam clamps.
2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
3. Do not drill holes in main structural steel members.
4. "C" clamp type of upper hanger attachments with restraining straps may be used as upper hanger attachments for the support of piping up to a maximum of 3 inches in size and a temperature from 50 degrees F to 200 degrees F.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members

where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.
2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
3. Do not drill holes in main structural steel members.
4. "C" clamp type of upper hanger attachments with restraining straps may be used as upper hanger attachments for the support of piping up to a maximum of 3 inches in size and a temperature from 50 degrees F to 200 degrees F.

C. Attachment to Concrete Filled Steel Decks (Total thickness, 2-1/2 inches or more): Where necessary, attach hangers to the deck with welding studs (except at roof decks), thru-bolts with fish plates or tee hangers. Do not support a load, in excess of 250 lbs from any single welded stud**.**

D. Attachment to Cast-In-Place Concrete: Secure to overhead construction by means of cast-in-place concrete inserts.

E. Attachment to Existing Cast-In-Place Concrete:

1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

F. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Secure attachments to structural steel wherever possible. When fill is applied over decks, thru-bolts and fish plates may be used to support piping up to a maximum of 4 inches in size; mechanically expanded rod hangers or toggle bolts may be installed in cells for the support of piping up to a maximum of 2-1/2 inches in size.

G. Attachment to Hollow Block or Tile Filled Concrete Decks: Secure hangers to structural steel wherever possible. Inserts may also be used by omitting a block and pouring a solid concrete block, with a cast-in-place insert where required.

H. Attachment to Waffle Type Concrete Decks: Provide cast-in-place inserts where required. When fill is applied over deck, thru-bolts and fish plates may be used.

I. Attachment to Precast Concrete Tee Construction:

1. Secure hangers to tees by any of the following methods:
   a. Tee hanger inserts between adjacent flanges.
   b. Thru-bolts and fish plates, except at roof deck without concrete fill.
   c. Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.
2. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.
3. Do not use powder driven fasteners.

J. Attachment to Wood Construction: Secure hangers to the sides (only) of wood members, by means of malleable iron side beam connectors, or malleable iron or steel side beam brackets. Do not secure hanger attachments to nailing strips resting on top of steel

beams. - **DELETE WHEN CONSTRUCTION IS MASONRY AND/OR STEEL**.

1. Secure side beam connectors to wood members with two No. 18 x 1-1/2 inch long wood screws, or two No. 16 x 1-1/2 inch long drive screws. Do not support piping over 1-1/2 inches in size from side beam connectors. Do not hammer in wood screws.
2. Secure side beam brackets to wood members with steel bolts or lag screws. Do not use lag screws in wooden members having a nominal thickness (beam face) under 2 inches in size. Install bolts or lag screws, in the sides of a timber or a joist, at the mid-point or above, not less than 2-1/2 inches from the lower edge when supporting branch lines and not less than 3 inches from the lower edge when supporting mains. Install heavy gage steel washers under all nuts.
3. Secure side beam brackets to wooden beams or joists, with lag screws or bolts of size as follows:

PIPE SIZE (Inches)	LAG SCREW SIZE (Inches)	BOLT DIAMETER (Inches)
2 and under	3/8 diam x 1-3/4	3/8
2-1/2 and 3	1/2 diam x 2	1/2
4 and 5"	Use bolt	5/8

   a. Do not support piping larger than 3 inches with lag screws. Pre-drill holes for lag screws 1/8 inch in diameter less than the root diameter of the lag screw thread.
   b. The minimum width of the lower face of wood beams or joints in which lag screws of size as specified may be used is as follows:

LAG SCREW DIAMETER (Inches)	NOMINAL WIDTH OF BEAM FACE (Inches)
3/8	2
1/2	3

4. Do not secure hanger attachment to the diagonals or vertical members of the trusses.

3.04 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

A. Install pipe anchors, restraints and sway braces, at locations noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, away from anchor points. Install anchors independent of all hangers and supports, and in a manner which will not affect the structural integrity of the building.

3.05 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for

cold and hot service insulated piping. Direct hanger contact of pipe for hot or cold piping is not allowed. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.06 PIPE SUPPORT FOR SYSTEMS INSULATED WITH FLEXIBLE ELASTOMERIC FOAM

A. Install a single-piece thermally insulated pipe hanger with self-adhesive closure at all points of support for piping or tubing to be insulated for cold and hot service insulated piping. Direct hanger or clamp contact of pipe for hot or cold piping is not allowed.

3.07 PIPE INSULATION SHIELDS – USE WHEN COLD WATER SERVICE INSULATION IS SPECIFIED

A. Install a pipe insulation shield (unless provided with a combination clevis hanger as described above) at all points of support, for cold and hot service insulated piping. Direct hanger contact of pipe for hot or cold piping is not allowed. Center shields on all hangers and supports, and install in such a manner so as not to cut, puncture or compress insulation.

3.08 PIPE COVERING PROTECTION SADDLES – USE WHEN HOT SERVICE INSULATION IS SPECIFIED AND PIPING IS 6 INCHES IN SIZE AND LARGER

A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

END OF SECTION 230529

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SECTION 230550 - VIBRATION ISOLATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish and install vibration control devices, materials, and related items. Perform all work as shown on the drawings and as specified herein to provide complete vibration isolation systems in proper working order.

1.02 SUBMITTALS

A. Refer to related sections elsewhere for procedural instructions for submittals.

B. Before ordering any products, submit shop drawings of the items listed below. The shop drawings must be complete when submitted and must be presented in a clear, easily understood form. Incomplete or unclear presentation of shop drawings may be reason for rejection of the submittal.

1. A complete description of products to be supplied, including product data, dimensions, specifications, and installation instructions.
2. Detailed selection data for each vibration isolator supporting equipment, including:
   a. The equipment identification mark;
   b. The isolator type;
   c. The actual load;
   d. The static deflection expected under the actual load;
   e. The specified minimum static deflection.
3. Steel rails, steel base frames, and concrete inertia bases showing all steel work, reinforcing, vibration isolator mounting attachment method, and location of equipment attachment bolts.
4. Special details necessary to convey complete understanding of the work to be performed.

1.03 MATERIAL AND EQUIPMENT

A. All vibration isolation mounts shall be supplied by one of the following acceptable manufacturers:

Amber/Booth Co. (Houston, TX .....A.B.
AVNEC Incorporated (Floral Park, NY) .....CA.I.
Mason Industries Inc. (Hauppaughe, NY).....M.I.
Kinetics Noise Control Inc. (Dublin, OH). .....K.N.C.
Vibration Mountings & Controls Inc. (Butler, NJ) .....V.M.C.

B. Unless otherwise specified, supply only new equipment, parts and materials.

C. Substitutions of equal equipment beyond the alternatives listed will be permitted only with the written permission of the Engineer. Accompany each request for acceptance of substitute equipment with manufacturer's certified data proving the equivalence of the proposed substitute in quality and performance. The Engineer shall be the final judge of the validity of the data submitted.

1.04 REQUESTS FOR CHANGE

A. Any requests for changes to the specifications must be submitted in writing at least ten days prior to bid closing. Approval will be given through a written addendum.

1.05 QUALITY ASSURANCE

A. Coordinate the size, location, and special requirements of vibration isolation equipment and systems with other trades. Coordinate plan dimensions with size of housekeeping pads.

B. Provide vibration isolators of the appropriate sizes, with the proper loading to meet the specified deflection requirements.

C. Supply and install any incidental materials such as mounting brackets, attachments and other accessories as may be needed to meet the requirements stated herein, even if not expressly specified or shown on the drawings, without claim for additional payment.

D. Verify correctness of equipment model numbers and conformance of each component with manufacturer's specifications.

E. Should any rotating equipment cause excessive noise or vibration when properly installed on the specified isolators, the Contractor shall be responsible for rebalancing, realignment, or other remedial work required to reduce noise and vibration levels. Excessive is defined as exceeding the manufacturer's specifications for the unit in question.

F. Upon completion of the work, Engineer shall inspect installation and shall inform installing contractor of any further work that must be completed. Make all adjustments as directed by Architect that result from the final inspection. Work shall be done before vibration isolation systems are accepted.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATOR TYPES

A. General

1. All springs installed out-of-doors shall be cadmium-plated, zinc electroplated or powder-coated after fabrication. Hardware and other metal parts shall be cadmium-plated or galvanized. Galvanizing shall meet ASTM Salt Spray Test Standards and Federal Test Standard No. 14.
2. All isolators installed out-of-doors shall have base plates with bolt holes for fastening the isolators to the support members.
3. Isolator types are scheduled to establish minimum standards. At the Contractor's option, labor-saving accessories can be an integral part of isolators supplied to provide initial lift of equipment to operating height, hold piping at fixed elevations during installation and initial system filling

operations, and similar installation advantages. Accessories and seismic restraint features must not degrade the isolation performance of the isolators.

4. Static deflection of isolators shall be as provided in the EXECUTION section and as shown on the drawings. All static deflections stated are the minimum acceptable deflection for the mounts under actual load. Isolators selected solely on the basis of rated deflections are not acceptable and will be disapproved.

B. Type FSN (Floor Spring and Neoprene)

1. Spring isolators shall be freestanding and laterally stable without any housing. Spring diameter shall be not less than 0.8 of the compressed height of the spring at the rated load. Springs shall have a minimum additional travel-to-solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately 1 (one). All mounts shall have leveling bolts.
2. The spring element in the isolator shall be set in a neoprene cup and have a steel washer or a flat surface in contact with the neoprene to distribute the load evenly over the bearing surface of the neoprene. Alternatively, each isolator shall be mounted on a Type NP isolator. If the NP isolator is used, a rectangular bearing plate of appropriate size shall be provided to load the pad uniformly within the manufacturer's recommended range. If the isolator is to be fastened to the building and the NP isolator is used, GROMMETS shall be provided for each bolt hole in the base plate.
3. If the basic spring isolator has a neoprene friction pad on its base and an NP isolator is to be added to the base, a galvanized steel, stainless steel or aluminum bearing plate shall be used between the friction pad and the NP isolator. If the isolator is outdoors, bearing plates shall not be made of galvanized steel. The NP isolator, bearing plate and friction pad shall be permanently adhered to one another and to the bottom of the isolator base plate.
4. Type FSN isolators shall be one of the following products with the appropriate neoprene pad (if used) selected from Type NP or acceptable equal:

Type SW .....A.B.
Type FSS.....A.I.
Type SLF .....M.I.
Type FDSK. .....N.C.
Series A .....V.M.&C.

C. Type FSNTL (Floor Spring and Neoprene Travel Limited)

1. Spring isolators shall be freestanding and laterally stable without any housing. Spring diameter shall be not less than 0.8 of the compressed height of the spring at the rated load. Spring shall have a minimum additional travel-to-solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately 1 (one). All mounts shall have leveling bolts. All mounts shall have vertical travel limit stops to control extension when weight is removed. The travel limit stops shall be capable of serving as

blocking during erection of the equipment. A minimum clearance of 1/4" shall be maintained around restraining bolts and between the limit stops and the spring to avoid interference with the spring action.

2. The spring element in the isolator shall be set in a neoprene cup and have a steel washer or a flat surface in contact with the neoprene to distribute the load evenly over the bearing surface of the neoprene. Alternatively, each isolator shall be mounted on a Type NP isolator. If the NP isolator is used, a rectangular bearing plate of appropriate size shall be provided to load the pad uniformly within the manufacturer's recommended range. If the isolator is to be fastened to the building and the NP isolator is used, GROMMETS shall be provided for each bolt hole in the base plate.
3. If the basic spring isolator has a neoprene friction pad on its base and an NP isolator is to be added to the base, a galvanized steel, stainless steel or aluminum bearing plate shall be used between the friction pad and the NP isolator. If the isolator is outdoors, bearing plates shall not be made of galvanized steel. The NP isolator, bearing plate and friction pad shall be permanently adhered to one another and to the bottom of the isolator base plate.
4. Type FSNTL isolators shall be one of the following products, with the appropriate neoprene pad (if used) selected from Type NP or acceptable equal:

   Type CT .....A.B.
   Type RS.....A.I.
   Type SLR.....M.I.
   Type FLS.....K.N.C.
   Series AWR.....V.M.&C.

D. Type FN (Floor Neoprene)

1. Neoprene isolators shall be neoprene-in-shear type with steel reinforced top and base. All metal surfaces shall be covered with neoprene. The top and bottom surfaces shall be ribbed. Bolt holes shall be provided in the base and the top shall have a threaded fastener. The mounts shall include leveling bolts that may be rigidly connected to the equipment.
2. Type FN isolators shall be one of the following products or acceptable equal:

   Type RVD.....A.B.
   Type NCM .....A.I.
   Type ND.....M.I.
   Type RD .....K.N.C.
   Series RD .....V.M.&C.

E. Type PCF (Precompressed Fiberglass)

1. Precompressed fiberglass blocks shall be made of molded inorganic glass fiber that is individually coated and sealed with an impervious elastomeric membrane. Fiberglass shall be severely overloaded during manufacture to stabilize the material into a product that is permanent and has consistent, predictable dynamic properties.
2. Type PCF isolators shall be one of the following products or acceptable

equal.

Type KIP.....K.N.C.

F. Type NP (Neoprene Pad)

1. Neoprene pad isolators shall be one layer of 1/4" to 3/8" thick ribbed or waffled neoprene. The pads shall be sized so that they will be loaded within the manufacturer's recommended range.
2. Type NP isolators shall be one of the following products or acceptable equal:

Type NR.....A.B.
Type NP.....A.I.
Type W.....M.I.
Type NPS.....K.N.C.
Series Shear Flex.....V.M.&C.

G. Type DNP (Double Neoprene Pad)

1. Neoprene pad isolators shall be formed by two layers of 1/4" to 3/8" thick ribbed or waffled neoprene, separated by a galvanized steel, stainless steel or aluminum plate. If the isolator is outdoors, the plate shall not be made of galvanized steel. These layers shall be permanently adhered together. The pads shall be sized so that they will be loaded within the manufacturer's recommended range.
2. Type DNP isolators shall be formed from one of the following products or acceptable equal:

Type NR.....A.B.
Type DNP.....A.I.
Type WSW.....M.I.
Type NPS.....K.N.C.
Series Shear Flex.....V.M.&C.

H. Type HSN (Hanger Spring and Neoprene)

1. Vibration isolation hangers shall consist of a free standing and laterally stable steel spring and a neoprene element in series, contained within a steel housing. Spring diameters and hanger housing lower hole sizes shall be large enough to permit the hanger rod to swing through a 30° arc before contacting the housing. Alternatively, other provisions shall be made to allow for a 30° arc of movement of the bottom hanger rod without contacting the isolator housing. Spring diameter shall be not less than 0.8 of the compressed height of the spring at the rated load. Spring elements shall have a minimum additional travel-to-solid equal to 50% of the rated deflection. The neoprene element shall be designed to have a 0.3" minimum static deflection. The deflection of both the spring element and the neoprene element shall be included in determining the overall deflection of Type HSN isolators.
2. Type HSN isolators shall be one of the following products or acceptable equal:

Type BSRA .....A.B.
Type SANSH .....A.I.
Type 30N .....M.I.
Type SRH or SFH .....K.N.C.
Type RSH or RFH .....V.M.&C.

I. Type HN (Hanger Neoprene)

1. Vibration isolation hangers shall consist of a neoprene-in-shear element contained within a steel housing. A neoprene neck bushing shall be provided where the hanger rod passes through the hanger housing to prevent the rod from contacting the hanger housing. The diameter of the hole in the housing shall be sufficient to permit the hanger rod to swing through a 30° arc before contacting the hanger housing.
2. Type HN isolators shall be one of the following products or acceptable equal:

Type BRD-A.....A.B.
Type SANH.....A.I.
Type HD.....M.I.
Type RH or FH .....K.N.C.
Type RHD or RFD .....V.M.&.C.

J. Type RI (Roof Isolator)

1. Roof isolators shall meet all of the requirements of the type FSNTL isolator, and shall be provided with waterproof spring covers that allow for the adjustment or removal of the springs. The isolators shall be provided with a structural top plate for the welding or bolting of supplementary support steel. The isolators shall accept 2 inch thick roofing insulation and be capable of being flashed directly into the roof membrane. Each isolator shall be provided complete with a wood nailer and flashing.
2. Type RI isolators shall be one of the following products or acceptable equal:

Type FRS .....A.I.

2.02 EQUIPMENT BASES

A. Type BSR (Base - Steel Rail)

1. Steel rail bases shall consist of structural steel sections sized to provide a rigid beam that will not twist, deform, or deflect in any manner that will negatively affect the operation of the supported equipment or the vibration isolation mounts. Rail bases shall include side mounting brackets for attachment of vibration isolators.
2. Type BSR bases will be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

Type C or CIS .....A.B.
Type SR.....A.I.
Type R or ICS .....M.I.
Type KRB or KFB.....K.N.C.

WFR or AR .....V.M.&C.

B. Type BSF (Base - Steel Frame)

1. Steel base frames shall consist of structural steel sections sized, spaced, and connected to form a rigid base which will not twist, rack, deform, or deflect in any manner which will negatively affect the operation of the supported equipment or the vibration isolation mounts. Frames shall be adequately sized to support basic equipment units and motors plus any associated pipe elbow supports, duct elbow supports, electrical control elements, or other components closely related and requiring resilient support in order to prevent vibration transfer to the building structure. The depth of steel frame bases shall be at least 1/10 the longest dimension of the base and not less than 6". The base footprint shall be large enough to provide stability for supported equipment.
2. Frame bases shall include side mounting brackets for attachment to vibration isolators. Mounting brackets shall be located on the sides of the base that are parallel to the axis of rotation of the supported equipment.
3. Type BSF bases shall be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

Type WX .....A.B.
Type SB.....A.I.
Type WFSL .....M.I.
Type SFB or SRB.....K.N.C.
Series WFB .....V.M.&C.

C. Type BIB (Base - Inertia Base)

1. Concrete inertia bases shall be formed of stone-aggregate concrete (150 lb./cu.ft.) and appropriate steel reinforcing cast between welded or bolted perimeter structural steel channels. Inertia bases shall be built to form a rigid base that will not twist, rack, deform, deflect, or crack in any manner that would negatively affect the operation of the supported equipment or the vibration isolation mounts. Inertia bases shall be adequately sized to support basic equipment units and motors plus any associated pipe elbow supports, duct elbow supports, electrical control elements, or other components closely related and requiring resilient support in order to prevent vibration transfer to the building structure. Inertia base depth shall be at least 1/12 the longest dimension of the inertia base and not less than 6". The base footprint shall be large enough to provide stability for supported equipment. Inertia bases shall include side mounting brackets for attachment to vibration isolators. Mounting brackets shall be located on the sides of the base that are parallel to the axis of rotation of the supported equipment.
2. The steel frame and reinforcement shall be supplied by the vibration isolator manufacturer. Concrete may be provided by the General Contractor.
3. Frame and reinforcement for Type BIB bases shall be one of the following products or acceptable equal:

Type CPF .....A.B.
Type CB.....A.I.

Type KSL .....M.I.
Type CIB-L or CIB-H .....K.N.C.
Series WPF .....V.M.&C.

D. Type RC-1 (Roof Curb, Type 1)

1. Type RC-1 isolation bases shall be a prefabricated assembly consisting of an extruded aluminum frame and steel spring isolation system that fits over the roof curb and under the isolated equipment. The aluminum frame shall be sufficiently rigid to support the equipment load without detrimental twist or deflection. Spring isolators shall be selected and positioned along the curb to achieve the minimum static deflection called for in the schedule. The static deflection shall be constant around the entire periphery of the base. Springs shall be free standing, laterally stable with a diameter of not less than 0.8 times the compressed height, and have additional travel-to-solid that is at least 50% of the rated deflection. Resilient neoprene snubbers shall be provided at the corners of the base to limit the movement of the equipment under wind load to 1/4".
2. The isolation curb base shall be made weather tight by sealing all around the periphery with closed cell neoprene or flexible membrane that shall in no way inhibit the vibration isolation of the spring elements. A closed cell sponge gasket or field caulking shall be used between the equipment unit and the isolation curb base and between the isolation curb and roof curb to form a weather-tight seal. Each spring isolator used in the curbs shall be weather-protected as described in the PRODUCTS section under General.
3. Type RC-1 vibration isolation curb bases shall be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

RTIR..... A.B.
Type CMAB.....M.I.
Type ASR .....K.N.C.
Series ATR .....V.M.&C.

E. Type RC-2 (Roof Curb, Type 2)

1. Type RC-2 isolation bases shall be a prefabricated assembly consisting of a structural steel frame and steel spring isolation system that forms the roof curb under the isolated equipment. The steel frame shall be sufficiently rigid to support the equipment load without detrimental twist or deflection. Spring isolators shall be selected and positioned along the curb to achieve the minimum static deflection called for in the schedule. The static deflection shall be constant around the entire periphery of the base. Springs shall be free standing, laterally stable with a diameter of not less than 0.8 times the compressed height, and have additional travel-to-solid that is at least 50% of the rated deflection. Spring elements shall include travel limit stops that are capable of serving as blocking during erection of the equipment. A minimum clearance of 1/4" shall be maintained around restraining bolts as they pass through the limit stop brackets. Springs and limits stops shall be adjusted to limit movement of the equipment under wind load to 1/4".

2. The isolation curb base shall be made weather tight by sealing all around the periphery with closed cell neoprene, flexible membrane or light gauge spring metal loop, which shall in no way inhibit the vibration isolation of the spring elements. A closed cell sponge gasket or field caulking shall be used between the equipment unit and the isolation curb base and between the isolation curb and roof curb to form a weather-tight seal. Each spring isolator used in the curbs shall be weather-protected as described in the PRODUCTS section under General.
3. Type RC-2 vibration isolation curb bases shall be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

   Type P .....A.I.
   Type RSC .....M.I.
   Type SSR.....K.N.C.
   Vibrocurb.....ThyCurb

F. RR (Roof Rail)

1. Roof rail bases shall consist of continuous structural support rails that combine equipment support and vibration isolation into one unitized assembly. The rails shall incorporate springs that are free standing, laterally stable with a diameter of not less than 0.8 times the compressed height, and have additional travel-to-solid that is at least 50% of the rated deflection. Spring elements shall include travel limit stops that are capable of serving as blocking during erection of the equipment. A minimum clearance of 1/4" shall be maintained around restraining bolts as they pass through the limit stop brackets. Springs and limits stops shall be adjusted to limit movement of the equipment under wind load to 1/4". The entire roof rail assembly shall be an integral part of the roof's membrane waterproofing and shall be dry galvanized or plastic-coated.
2. Type RR roof rail bases shall be one of the following products or acceptable equal:

   Type R.....A.I.

2.03 RESILIENT PENETRATION SLEEVE/SEAL

A. Resilient penetration sleeve/seals shall be field-fabricated from a pipe or sheet metal section that is l/2" to 3/4" larger than the penetrating element in all directions around the element, and shall be used to provide a sleeve through the construction penetrated. The sleeve shall extend 1" beyond the penetrated construction on each side. The space between the sleeve and the penetrating element shall be packed with glass fiber or mineral wool to within 1/4" of the ends of the sleeve. The remaining 1/4" space on each end shall be filled with acoustical sealant to form an airtight seal. The penetrating element shall be able to pass through the sleeve without contacting the sleeve. Alternatively, prefabricated sleeves accomplishing the same result are acceptable.

2.04 RESILIENT LATERAL SUPPORTS

A. These units shall either be a standard product of the vibration isolation mounting manufacturer, or be custom fabricated from standard components. These units

shall incorporate neoprene isolation elements similar to Type FN that are specifically designed to provide resilient lateral bracing of ducts or pipes.

B. Resilient lateral supports shall be one of the following products or acceptable equal:

Type Custom.....A.B.
Type RPTG.....A.I.
Type ADA.....M.I.
Type RGN .....K.N.C.
Type MDPA .....V.M.&C.

2.05 THRUST RESTRAINTS

A. Thrust restraints shall consist of a spring element in series with a neoprene pad. The unit shall be designed to have the same deflection due to thrust-generated loads as specified for the isolators supporting the equipment. The spring element shall be contained within a steel frame and be designed so it can be pre-compressed at the factory to allow for a maximum of 1/4" movement during starting or stopping of the equipment. Allowable movement shall be field-adjustable. The assembly shall be furnished complete with rods and angle brackets for attachment to both the equipment and the adjacent fixed structural anchor. The thrust restraints shall be installed on the discharge of the fan so that the restraint rods are in tension. Assemblies that place the rods in compression are not acceptable. The holes in the spring restraint brackets through which the restraint rods pass must be oversized to prevent contact between the brackets and rods.

B. Thrust restraints shall be one of the following products or an acceptable equal:

Type TRK.....A.B.
Type TR.....A.I.
Type WB .....M.I.
Type HSR.....K.N.C.

2.06 GROMMETS

A. Grommets shall be specially formed to prevent bolts from directly contacting the isolator base plate, and shall be sized so that they will be loaded within the manufacturer's recommended load range.

B. Grommets shall either be custom made by combining a neoprene washer and sleeve, or be one of the following products or an acceptable equal:

Type Isogrommets.....MBIS, Inc. (Bedford Heights, OH)
Type WB.....Barry Controls (Brighton, MA)
Type HG .....Mason Industries, Inc. (Hauppauge, NY)

2.07 ACOUSTICAL SEALANT

A. Sealants for acoustical purposes as described in this specification shall be silicone or one of the non-setting sealants indicated below:

Acoustical sealant .....D.A.P.

BR-96 .....Pecora
Acoustical sealant.....Tremco
Acoustical sealant.....U.S.G.

PART 3 - EXECUTION

3.01 APPLICATION

A. General

1. Refer to the PRODUCTS section of this specification for vibration isolation devices identified on the drawings or specified herein.
2. The static deflection of all isolators specified herein are the minimum acceptable deflections for the mounts under actual load. Isolators selected solely on the basis of rated deflection are not acceptable and will be disapproved.

B. Major Equipment

1. Unless otherwise shown or specified, all floor-mounted major equipment shall be set on 4" high concrete housekeeping pads.
2. Types and minimum static deflections of vibration isolation devices for major equipment items shall be as scheduled on the drawings or specified hereunder.
3. Thrust restraints shall be installed on all suspended fans and on all floor-mounted fans developing 4" or more of static pressure, unless the horizontal component of the thrust force can be demonstrated to be less than 10% of the equipment weight.

C. Miscellaneous Mechanical Equipment: Miscellaneous pieces of mechanical equipment such as expansion tanks which are connected to isolated piping systems shall be vibration-isolated from the building structure by Type NP or Type HN isolators (selected for 0.1" static deflection) unless their position in the piping system requires a higher degree of isolation as called for under Pipe Isolation.

D. Pipes

1. All hot water, drain and engine exhaust piping that is connected to vibration-isolated equipment shall be isolated from the building structure within the following limits:
   a. Within 100' total pipe length of connected vibration-isolated equipment (chillers, pumps, air handling units, etc.)
2. Piping shall be isolated from the building structure by means of vibration isolators, resilient lateral supports, and resilient penetration sleeve/seals.
3. Isolators for the first three support points adjacent to connected equipment shall achieve one half the specified static deflection of the isolators supporting the connected equipment. When the required static deflection of these isolators is greater than 1/2", Type FSN or HSN isolators shall be used. When the required static deflection is less than or equal to 1/2", Type FN or HN isolators shall be used. All other pipe support isolators within the specified limits shall be either Type FN or HN

achieving at least 1/4" static deflection.

4. Where lateral support of pipes is required within the specified limits, this shall be accomplished by use of resilient lateral supports.
5. Pipes within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.
6. Provide flexible pipe connections as called for under Major Equipment above and wherever shown on the drawings.

E. Ductwork

1. All sheet metal ducts and air plenums that are within mechanical rooms or within a distance of 50' total duct length of connected vibration-isolated equipment (whichever is longer) shall be isolated from the building structure by Type FN, PCF or HN isolators. All isolators shall achieve 0.1" minimum static deflection.
2. Ducts within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.

3.02 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT

A. General

1. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment as well as for proper operation.
2. Installation of vibration isolation equipment shall be in accordance with the manufacturer's instructions.

B. Isolators

1. All vibration isolators shall be aligned squarely above or below mounting points of the supported equipment.
2. Isolators for equipment with bases shall be located on the sides of the bases which are parallel to the equipment shaft unless this is not possible because of physical constraints.
3. Locate isolators to provide stable support for equipment, without excess rocking. Consideration shall be given to the location of the center of gravity of the system and the location and spacing of the isolators. If necessary, a base with suitable footprint shall be provided to maintain stability of supported equipment, whether or not such a base is specifically called for herein.
4. If a housekeeping pad is provided, the isolators shall bear on the housekeeping pad and the isolator base plates shall rest entirely on the pad.
5. Hanger rods for vibration-isolated support shall be connected to structural beams or joists, not floor slab between beams and joists. Provide suitable intermediate support members as necessary.
6. Vibration isolation hanger elements shall be positioned as high as possible in the hanger rod assembly, but not in contact with the building structure, and so that the hanger housing may rotate a full 360° about the rod axis without contacting any object.
7. Parallel running pipes may be hung together on a trapeze that is isolated

from the building. Isolator deflections must be the greatest required by the provisions for pipe isolation for any single pipe on the trapeze. Do not mix isolated and unisolated pipes on the same trapeze.

8. Pipes, ducts and equipment shall not be supported from other pipes, ducts and equipment.
9. Resiliently isolated pipes, ducts and equipment shall not come in rigid contact with the building construction or rigidly supported equipment.
10. The installed and operating heights of equipment vibration-isolated with Type FSNTL or Type RI isolators or with Type RC-2 or Type RR isolation bases shall be identical. Limit stops shall be out of contact during normal operation. Adjust isolators to provide 1/4" clearance between the limit stop brackets and the isolator top plate, and between the travel limit nuts and travel limit brackets.
11. Adjust all leveling bolts and hanger rod bolts so that the isolated equipment is level and in proper alignment with connecting ducts or pipes.
12. Type RI isolators shall be installed in strict accordance with the manufacturer's instructions.

C. Bases

1. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is acceptable to the equipment manufacturer. This provision shall apply whether or not a base frame is called for on the schedule. In the case that a base frame is required for the unit because of the equipment manufacturer's requirements and is not specifically called for on the equipment schedule, a base frame recommended by the equipment manufacturer shall be provided at no additional expense.
2. Unless otherwise indicated, there is to be a minimum operating clearance of 1" between steel rails, steel frame bases or inertia bases and the floor beneath the equipment. The isolator mounting brackets shall be positioned and the isolators adjusted so that the required clearance is maintained. The clearance space shall be checked by the Contractor to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
3. Type RC-2 and Type RR isolation bases shall be installed in strict accordance with the manufacturer's instructions.

D. Thrust Restraints: Thrust restraints shall be attached on each side of the fan at the vertical centerline of thrust. The two rods of the thrust restraint shall be parallel to the thrust force. This may require custom brackets or standoffs. The body of the thrust restraint shall not come in contact with the connected elements. Thrust restraints shall be adjusted to constrain equipment movement to the specified limit.

E. Grommets: Where grommets are required at hold down bolts of isolators, bolt holes shall be properly sized to allow for grommets. The hold down bolt assembly shall include washers to distribute load evenly over the grommets. Bolts and washers shall be galvanized.

F. Resilient Penetration Sleeve/Seals: Maintain an airtight seal around the penetrating element and prevent rigid contact between the penetrating element

and the building structure. Fit the sleeve tightly to the building construction and seal airtight on both sides of the construction penetrated with acoustical sealant.

END OF SECTION 230550

MP:xx

SECTION 230553 - PIPE AND VALVE IDENTIFICATION

PART 1 - GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

1.02 REFERENCES

ANSI A13.1 - Scheme for Identification of Piping Systems

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

W.H. Brady Co., Milwaukee, WI.
Emed Co., Buffalo, NY.
Panduit Corp., Tinley Park, IL.
Seton Nameplate Corp., New Haven, CT.
Bunting Inc., Pittsburgh, PA.

2.02 PIPE MARKERS AND ACCESSORIES

A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.

B. Strap-On Marker: Strip type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.

C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.

D. Pipe Marker Legend and Color Field Sizes:

OD of Pipe or Insulation (Inches)	Letter Size (Inches)	Length of Color Field (Inches)
3/4 to 1-1/4 incl.	1/2	8
1-1/2 to 2 incl.	3/4	8
2-1/2 to 6 incl.	1-1/4	12
8 to 10 incl.	2-1/2	24
Over 10	3-1/2	32

E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.

1. Plain Tape: Unprinted type; color to match pipe marker background.
2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.

F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

2.03 PIPE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B & S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.

B. Size: 2 inch square tag.

C. Fasteners: Brass "S" hook or brass jack chain of size as required for pipe to which tag is attached.

2.04 VALVE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B & S gage brass, with 1/4 inch high valve service abbreviated lettering on one line over 1/2 inch high valve service chart number, both deep stamped and black filled; and with 3/16 inch top hole for fastener.

B. Sizes: HVAC Use: 1-1/2 inch dia round.

C. Fasteners: Brass “S” hook or brass jack chain of size as required for valve stem or handle to which tag is attached.

2.05 VALVE SERVICE IDENTIFICATION CHART FRAMES

A. Type: Satin finished extruded aluminum frame with rigid clear plastic glazing, size to fit 8-1/2 x 11 inches valve chart.

PART 3 - EXECUTION

3.01 PREPARATION

A. Complete testing, insulation and finish painting Work prior to completing the Work of this Section.

B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturers printed installation instructions, unless otherwise specified.

B. Stick-On Pipe Markers:

1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.
2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.

C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified locations, 90 degrees apart on visible side of pipe.

D. Pipe Service Identifications Tags: Attach tags to piping being identified with "S" hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

A. Piping Identification Types:

1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.
3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.

B. Identify all piping systems, installed within and exterior of the building, piping exposed to view, above all ceilings, bare and insulated, as to content, size of pipe and direction of flow, with the following exceptions:

1. Piping in furred wall spaces, except in valve access panels where valves and piping shall be identified as specified for exposed piping systems.
2. Piping exposed in finished spaces such as offices, classrooms, wards, toilet rooms, shower rooms and spaces as specified.

C. Locate piping identification (with in 24") at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs. Where two or more pipes run in a parallel, place the printed legend and other markers in the same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

A. Valve Service Identification Tags:

1. Tag service, balance, isolation and control valves installed under this project, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
   a. Valves in heating, ventilating, air conditioning and refrigeration systems.

B. Valve Service Identification Charts:

1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white

bond paper, indicating valve number, service and location.

2. Hang framed charts at locations as directed.

END OF SECTION 230553

SECTION 230554 - DUCT AND EQUIPMENT IDENTIFICATION

PART 1 - GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each item specified

1.02 DELIVERY, STORAGE AND HANDLING

A. Deliver paint to the Site in original, new unopened containers, bearing manufacturers' printed labels.

B. Store materials at the site where directed. Keep storage space clean and accessible to the Engineer at all times.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Paint: Semi-gloss enamel (latex base) complying with the requirements of FS TT-P-001511.

PART 3 - EXECUTION

3.01 PREPARATION

A. Do not execute the Work of this Section until all testing, insulation and finish painting Work have been completed.

B. Place drop cloths or other suitable protection as required to avoid damage and paint spatters on adjacent surfaces.

3.02 DUCT IDENTIFICATION

A. Identify exposed ductwork, bare or insulated, directly connected to air handling apparatus, in the following spaces or rooms, by means of painted stenciled legends:

1. Mechanical Equipment Room
2. Steam Service
3. Refrigeration Machine
4. Boiler Room
5. Penthouse.
6. Power House

B. Locate stenciled legends to be readily visible from any point of observation. Stencil identification along center line of duct, close to equipment. Where view is unobstructed from two directions, apply two sets of stenciling (both sides), visible from each direction.

C. Letter Size: 1-1/2 inches in height.

D. Samples of Ductwork Identification:

1. Outside Air (OA)
2. Supply Air (SA)
3. Return Air (RA)
4. Exhaust Air (EA)

E. Colors: Paint stenciled letters black. Where the background color is dark, paint background white before stenciling.

3.03 EQUIPMENT IDENTIFICATION

A. Identify mechanical equipment, bare or insulated, installed in the following spaces or rooms, by means of painted stenciled legends:

1. Mechanical Equipment Room
2. Steam Service
3. Refrigeration Machine
4. Boiler Room
5. Penthouse
6. Power House
7. Roof – Provide engraved aluminum nameplate
8. At Grade – Provide engraved aluminum nameplate

B. Paint stenciled legends black, a minimum of 1-1/2 inches (6 inches in Mechanical Equipment Rooms) in height, located to be readily visible from a reasonable point of view. Place identification along center line of equipment, if possible.

C. Engraved Plastic-Laminate Signs (Interior use where paint stencil is not appropriate.):

1. ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
2. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
3. Thickness: 1/16 inch, for units up to 20 square inches or 8 inches length; 1/8 inch for larger units
4. Fasteners: Self-tapping stainless steel screws or aluminum pop rivet

D. Engraved Aluminum Nameplate:

1. Black surface, with white (letter color). Fabricate in sizes required for message. Provide two side holes for mechanical fastening.
2. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
3. Thickness: 0.020 inch.
4. Fasteners: Self-tapping stainless steel screws or aluminum pop rivet

E. Samples of Equipment Identification:

1. Air Conditioning Unit AC-1
2. Supply Fan S-1
3. Exhaust Fan E-1
4. Return Fan R-1

3.04 ACCESS DOOR IDENTIFICATION

A. Access doors adjacent to fire damper, smoke damper or smoke detector shall be identified with letters no less than 1/2" high in accordance with NYS IMC.

3.05 APPLICATION OF PAINT

A. Stencil Painting: Apply with a brush or aerosol type spray can.

3.06 CLEANING

A. Clean adjacent surfaces of paint spatters resulting from the Work of this Section.

END OF SECTION 230554

SECTION 230593 - CLEANING AND TESTING

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals

1. Test Reports (Field Tests):
   a. Refrigeration Systems: Submit results of Refrigeration Systems Pressure - Dehydration Tests.
   b. Low Pressure Steam or Hot Water Heating Boilers: Submit results on Boiler Test.
   c. Propylene Glycol System Test: Submit results on Propylene Glycol Systems.

B. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.

2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
   a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.03 PROJECT CONDITIONS

A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.04 SEQUENCING AND SCHEDULING

A. Transmit written notification of proposed date and time of operational tests to the Owner at least 5 days in advance of such tests.

B. Perform cleaning and testing Work in the presence of the Owner.

C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping

systems, or temporary valves or caps as required to perform the Work.

D. Duct Systems: Clean new and existing duct system(s) before testing, adjusting, and balancing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Test Equipment and Instruments: Type and kind as required for the particular system under test.

B. Test Media (air, gas, refrigerant, vacuum, water): As specified for the particular piping or system under test.

C. Cleaning Agent (chemical solution, steam, water): As specified for the particular piping, apparatus or system being cleaned.

D. Propylene Glycol: Permanent type inhibited anti-freeze solution as manufactured by Dow Chemical Co. or Union Carbide. Dowfrost or Ucar Protherm respectively. Final system concentration to be as noted on the drawings.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

B. Connections or extension of existing piped systems: Prior to connecting to any existing system(s), the Mechanical Contractor shall take sample of fluid and provide test reports of the existing fluids chemical, residuals and or glycol concentration to the Engineer for acceptance. If the test results have not been provided prior to connection, the Mechanical Contractor shall be held responsible in bringing the entire hydronic system within acceptable specifications. The Mechanical Contractor shall top off the new or existing glycol feed tank, at project closeout.

C. Thoroughly clean compressed air, control air, refrigerant pipe and similar systems prior to pressure or vacuum testing.

3.02 PRESSURE TESTS - PIPING

A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.

B. Water Systems:

1. Circulating water systems, including propylene glycol solution systems and cold water make-up piping connections to heating, ventilating, air conditioning and

refrigeration systems, unless otherwise specified:

a. Before final connections are made perform hydrostatic test at 1-1/2 times the maximum working pressure, but not less than 125 psig, for 4 hours.

b. After final connections are made perform hydrostatic retest at a pressure equal to maximum operating system design pressure, but not less than 30 psig, for 4 hours.

2. High temperature water systems (supply and return):

a. Before final connections are made perform hydrostatic test at 450 psig for 4 hours.

b. After final connections are made perform hydrostatic retest at a pressure equal to maximum operating design pressure, but not less than 250 psig for 4 hours.

C. Gas Piping: Before backfilling or concealment perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4 inches to 6 inches water column, air test at 15 inches Hg for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.

D. Air Piping:

1. Compressed Air: Test with air at 150 psig for one hour.
2. Control Air: Test with air at 50 psig for one hour.
3. Check joints for leaks with soap suds.

E. Vacuum Piping: Perform air test at 150 psig for one hour, followed by a vacuum test of 25 inches Hg for one hour, during which time the mercury shall remain stationary for the last 30 minutes of test.

3.03 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS - CLEANING AND OPERATIONAL TESTING

A. Circulating Water Systems:

1. Cleaning: Flush systems and apparatus, upon completion of pressure and miscellaneous tests. Completely open valves and flush each system with clean water, prior to chemical cleaning. Repeatedly flush at short intervals until twice the system water capacity has been flushed through. Chemically clean systems immediately following flushing operations. Circulate a solution consisting of Citri-Clean in dilution rates as indicated by manufacturer. Completely fill system with cleaning solution; vent system and place in operation, with automatic controls operating and valves fully open. Allow system to reach design operating temperature or an operating temperature designated by the Owner's Representative. Circulate the solution through the system for a minimum of 4 consecutive hours; immediately drain system and flush with clean water until the pH at the farthest drain matches the clean water input. Keep strainers unplugged during cleaning operations. Remove and clean strainer screens prior to operational test. Refill system with clean water.
2. Operational Test: Run system in an automatic mode for a minimum of 120 consecutive hours. During this time, make final adjustments, including the setting of the balancing valves.

B. Propylene Glycol Systems:

1. Clean as specified for circulating water systems.
2. Drain system and refill with water/propylene glycol mix. Add water or glycol as needed to obtain required mixture level.
3. Perform operational test as specified for circulating water systems with propylene glycol solution in system.

C. High Temperature Water Piping Systems:

1. Cleaning:
   a. Upon completion of pressure and miscellaneous tests, steam clean piping systems.
   b. Provide temporary piping as required to facilitate the cleaning operations. Include drain valves at low points in the temporary piping arrangement with waste piping from each drain valve, terminating at approved points of waste where directed.
   c. Subject piping system to a steam pressure of 10 psig for a period of 8 hours. During the 8 hour cleaning period, crack the drain valves open. At times as directed, fully open drain valves to blow down the system; repeat this procedure until the piping is declared clean by the Owner's Representative.
   d. Provide a temporary steam generator, with necessary appurtenances, of capacity to supply and maintain a 10 psig steam pressure on the piping system for steam cleaning purposes. Water and electric power will be available at the building, in which the piping system is installed.
   e. Remove the temporary equipment and appurtenances upon completion of cleaning.
2. Operational Test: Run system in an automatic mode for a minimum of 120 consecutive hours. During this time, make final adjustments.

3.04 DUCT SYSTEM AND EQUIPMENT CLEANING

A. Duct Systems:

1. Use service openings for entry and inspection.
   a. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Ductwork Accessories" for access panels and doors.
   b. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
   c. Remove and reinstall ceiling to gain access during the cleaning process.

2. Particulate Collection and Odor Control:

   a. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for O.3-micron-size (or larger) particles.
   b. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

B. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

C. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.05 REFRIGERATION SYSTEMS - TESTING, DEHYDRATION AND CHARGING

A. Leak Test Procedure:
1. Refrigerant Piping Systems:
   a. Pressurize with dry nitrogen to 50 psig and test for leaks using a bubble type solution.
   b. Release this partial test pressure and correct deficiencies.
   c. Charge system with a trace of refrigerant to 15 psig, then add dry nitrogen until system test pressures are reached and retest for leaks with an electronic leak detector.
   d. Release pressure, repair leaks and retest as necessary until no leaks occur.
   e. Recover refrigerant used for leak testing.
2. System Test Pressures:
   a. Charge system with dry nitrogen and trace of refrigerant (HFC 134A, HFC 245, HFC 404, HFC 407C, HFC 410A or HFC 507) to 350 psig and retest for leaks with an electronic leak detector. The system must stay at 350 psig pressure for 24 hours to pass the system test pressure test.
   b. Release pressure, repair leaks and retest as necessary until no leaks occur.
   c. Recover refrigerant used for leak testing.

B. Dehydration:
   1. Low and Ultra Low Temperature Refrigeration Systems (-30 degrees F to 32 degrees F:
      a. Following pressure tests, dehydrate each system with a vacuum pump.
      b. Draw and hold an initial vacuum of 800 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
      c. Draw and hold a second vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
      d. Draw and hold a third vacuum of 250 microns for 8 to 12 hours with an allowable maximum rise of 50 microns. Break this third vacuum by adding liquid refrigerant specified for the equipment to the high side of the system (liquid line).
      e. Verify vacuum obtained with an electronic vacuum gage.
   2. Medium Temperature Refrigeration Systems (33 degrees F to 55degrees F), and Air Conditioning Systems:
      a. Following pressure tests, dehydrate each system with a vacuum pump.
      b. Draw and hold an initial vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
      c. Draw and hold a second vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
      d. Verify vacuum obtained with an electronic vacuum gage.

C. Refrigerant Charging: Follow equipment manufacturer's printed charging directions unless otherwise specified.
   1. Introduce refrigerant of type and quantity required through a filter/drier installed in the temporary charging line.
      a. Purge small amount of liquid out of the system side of the charging hose.
      b. Prevent moisture and other contaminants from entering the system.
   2. Charge liquid refrigerant through a charging valve provided in the high pressure side of the system.
      a. Small amounts of gaseous refrigerant may be charged through the compressor suction service valve port.
   3. No bubbles shall appear at the moisture-liquid indicator when the system is fully charged and operational. Do not overcharge.
   4. Record the weight in pounds of refrigerant charged into each system and submit this record to the Owner.

E. Adjustments and Operational Testing:
   1. Adjustments: Place the system in operation with automatic controls functioning. Adjust controls and apparatus for proper operation. Test thermometers and gages for accuracy over the entire range. Remove and replace items found defective.
      a. Check belts, fan blades, fittings, TXV bulbs, and electrical connections for tightness before start up.
      b. Check TXV bulb for proper location should be between 8 and 10 o'clock or 2 & 4 o'clock.
      c. Seal off all holes in the condition space as specified.
      d. Provide a point to point control check of the system to ensure that the specified inputs and outputs are receiving the signal from the proper sensors or controlling the proper device.

e. Set pressure controls and safety controls.
f. Close or de-energize all solenoids, and start up the system.
g. Check that all controls and safety switches are operating properly.
h. Adjust TXV for proper super heat back to the compressors.
i. Clean TXV strainers as many times as required.
j. After one week of run time, change the liquid cores if they are the replaceable type.
k. After one month of run time, replace the liquid cores and compressor suction socks. Replace the liquid cores as required. Clean the TXV's as required.

2. Operational Test:
   a. Place system in operation, with final connections to equipment and with automatic controls operating, and operate for a minimum of 120 consecutive hours.
   b. Operational test shall prove to the satisfaction of the Owner that the system can produce the cooling effect required by the drawings and the specifications.

3.06 INSTALLATION

A. Automatic Glycol Feed Package, complete with valves and piping, as recommended by the equipment manufacturer and indicated on the drawings.

B. Glycol System(s): following system cleaning, fill specified glycol system and feed tank to indicated percentage of glycol/water solution indicated. Glycol feed tank shall be topped off at project closeout.

C. Connections or extension of existing glycol piping systems: Prior to connecting to the existing system(s), the Mechanical Contractor shall take sample of fluid and provide test reports of the existing fluids concentration of glycol and residuals to the Engineer for acceptance. If the test results have not been provided prior to connection, the Mechanical Contractor shall be held responsible in bringing the entire hydronic system within acceptable specifications. The Mechanical Contractor shall top off the new or existing glycol feed tank, at project closeout.

END OF SECTION 230593

SECTION 230594 - BALANCING OF SYSTEMS

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals:

1. Testing, Adjustment and Balancing Reports: Submit final testing and balancing results on applicable report forms, as approved or furnished by the environmental systems balancing council or bureau, which is certifying the independent member agency performing the Work, required by this Section. Each final systems report form shall bear the signature of the person performing the Work and recording the data and the signature of the certified supervisor for the performing agency. Submit simultaneously with the final reports, a list of the instruments used with the last date of calibration for each instrument.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. Provide the services of a certified independent agency for the testing, adjustment and balancing of all air distribution and hydronic distribution systems complete with all connected apparatus and equipment. The agency shall be certified by the Associated Air Balance Council Bureau - AABC, Washington, DC 20005, National Environmental Balancing Bureau - NEBB, Arlington, Va. 22209 or by pre-approval of the engineer.
2. The Work shall be performed by skilled mechanical technicians under the direct supervision of certified personnel in the employ of the independent agency. The supervisor shall be personally certified by the national council or bureau, as approved by the Engineer.

1.03 SEQUENCING AND SCHEDULING

A. Scheduling:

1. Perform environmental systems testing and balancing after cleaning, miscellaneous testing, adjustment and operational testing Work has been completed.
2. Test and balance system during a period of time when outside temperature conditions will impose a significant load on the system; i.e., summer months for air conditioning system, winter months for heating system. Balance and adjust systems accordingly. Return to the site as required.
3. Send written notification to the Owner's Representative a minimum of five days prior to the performance of testing and balancing Work. Perform testing and balancing Work in the presence of the Owner's Representative.

1.04 ACCURACY

A. Outlets and equipment shall be balanced to within 5% of design airflows. Portions of systems unable to be balanced to these criteria shall be brought to the attention of the Engineer.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. General Information: Test instruments are included in this specification for information only. Balancing of air and hydronic systems shall be performed by qualified personnel utilizing company owned test instruments, which will remain the property of the company. Use test instruments which are in first class operating condition, with individual calibration histories to guarantee their accuracy. Test instruments shall be of type and kind as required by the type of system installed. Trade names and manufacturer's names are mentioned in this section for descriptive purposes only; instruments of equivalent range and capabilities may be utilized.

B. Air Balancing Instruments:

1. Manometers: Inclined with ranges of 0 to 1/4" and 0 to 1"; Combination inclined and vertical with a range of 0 to 5" and U tube type, 18".
2. Portable "Magnehelic" Draft Gages: Ranges 0 to 1/2", 0 to 1" and 0 to 5".
3. Anemometers: Deflecting vane type with a range of 100 to 3000 fpm, similar to Alnor Velometer Model 6000 BP and 4" diameter rotating vane type.
4. Pitot Tubes: ASHRAE standard type, stainless steel, 5/16" diameter, lengths as required.
5. Sling Psychrometer.
6. Smoke Candles and Smoke Generator.
7. Flowhoods with hoods to match air outlet sizes used on project.

C. Hydronic Balancing Instruments:

1. Calibrated Test Gages: Ranges 0 to 30 lbs., 0 to 60 lbs., 0 to 200 lbs.
2. Calibrated Test Gages (Compound Type): Ranges from -30" to 30 lbs. and -30" to 60 lbs.
3. U Tube Manometer: 36".

D. Air and Hydronic Systems Balancing Instruments:

1. Thermometers: 12" mercury column type and dial type, with a range of -40 to +120 degrees F. and 0 to 220 degrees F. Total of four thermometers.
2. Universal Hand Tachometer: Herman H. Sticht Type UH.
3. Stop Watch.
4. Stroboscope.
5. Contact Pyrometer: Thermocouple type.
6. Volt-Ohm-Ammeter Test Kit, High Current Type: Sperry "Ohmprobe".
7. Volt-Ammeter: With leads for connecting to lugs.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Inspection: Prior to the environmental testing and balancing of hydronic and air distribution systems, the certified supervisor in the employ of the testing and balancing agency shall inspect the installations and notify the Owner's Representative of any Work

which must be performed or modified prior to initiating testing and balancing procedures.

B. Performance: Test and balance environmental hydronic and air distribution systems, including all connected equipment and apparatus, so as to conform to the design conditions. Perform the Work of this section in accordance with the published standards of the balancing council or bureau, which is certifying the member firm. Record all test readings, calculations and results.

END OF SECTION 230594

SECTION 230719 - PIPING INSULATION

PART 1 GENERAL

1.01 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Insulation Schedule: Schedule shall list all systems and indicate by system the type of insulation, jacketing, etc, to include manufacturer's model number and size for each service application.

C. Product Data for each Insulation type. Manufacturer's catalog sheets, specifications, and installation instructions for each item specified, excluding Miscellaneous Materials.

1.02 DEFINITIONS

A. Cold Service Insulation: Insulation on piping and/or equipment conveying fluids at below ambient temperatures.

B. Hot Service Insulation: Insulation on piping and/or equipment conveying fluids at above ambient temperatures.

C. Dual temperature service shall follow cold service requirements.

1.03 QUALITY ASSURANCE

A. Qualifications: The persons and supervisors performing the Work of this section shall be personally experienced in installing insulation and shall have been regularly performing such work for a minimum of 3 years while in the employ of a company or companies engaged in the installation of piping insulation.

B. Regulatory Requirements:

1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS

2.01 INSULATION

A. (Type-A) Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.

1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM 547:
   a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees

F; ASTM C 547, Class 1.

3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
   a. Suitable for temperatures up to 450 degrees F.

B. (Type-B) Flexible Elastomeric Foam Insulation:

1. FM tested and approved, meeting the following:
   a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
   b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
   c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
2. Pipe Insulation: ASTM C 534, Type I.
3. Polyethylene and polyolefin insulation is not acceptable.

2.02 JACKET MATERIAL

A. All Purpose Jacket: Vapor barrier type, factory or field applied over fiberglass insulation, comprised of a Kraft paper outer cover bonded to aluminum foil, and reinforced with fiberglass yarn. Jacket material shall be treated for permanent fire and smoke resistance. A vapor barrier jacket seal shall be accomplished with a 1-1/2" longitudinal flap, and 3" wide butt strips, factory supplied, for making circumferential joints.

1. Fire and Smoke Hazard Classification Rating (composite, including jacket and adhesive, ASTM E-84):
   a. Flame Spread: 25 or less.
   b. Smoke Developed: 50 or less.
2. Water Vapor Permeability (ASTM E-96): 0.02 perm.
3. Tensile Strength: 40 lb./in. width.
4. Mullen Burst: 70 psi.

B. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, factory cut and rolled to indicated sizes, fittings and pipe. As manufactured by: ITW Insulation Systems Houston Texas, Pabco-Childers or approved

1. Finish and Thickness: Smooth finish, 0.016 inch thick.

2. Moisture Barrier: 3-mil Dupont Surlyn.

C. Waterproof Membrane:

Waterproofing, High performance prefabricated 13-ply self-adhering, sheet-type waterproofing membrane with flexible aluminum material. Jacketing shall perform –30 degF to +300 degF service temperature. Zero weather and vapor moisture permeability, high puncture / tear resistance, mold inhibiting agents. Apply materials in complete accordance with the manufacturer's printed instructions manual. Furnish color (aluminum or white) as directed by Architect. Provide VentureClad Plus 1579CW or acceptable equal.

2.03 FITTING INSULATION

A. Fiberglass Insulation System:

1. Pre-molded fitting insulation: Same thickness as the adjacent pipe covering.
   a. Conform to FS-HH-I-558C, Form E, Class 16.
2. PVC/Fiberglass Fitting Insulation: Polyvinyl chloride pre-molded flexible fitting cover with batt type, pre-cut fiberglass insert.
   a. PVC: Conform with FS L-P-535C, Composition A, Type II, Grade GU.
   b. Fiberglass: Conform with FS HH-I-558C, Form B, Type I, Class 7&8.
3. Miter Cut Fitting Insulation: Fabricated from materials employed for pipe insulation.

B. Flexible Elastomeric Foam Insulation System: Miter cut fitting insulation, fabricated from materials employed for pipe insulation.

2.04 MISCELLANEOUS MATERIALS

A. Adhesive:

1. Vapor Barrier Jacket Adhesive: Foster Products Division, 85-20, Childers, CP-82, Epolux, Cad-o-prene, 400.
2. Reinforcing Membrane Adhesive: Foster Products Division 30-36; Childers, CP-50; Epolux, Cadalag 336.
3. Flexible Elastomeric Foam Adhesive: Foster Products Division, 85-75; Epolux, Cad-o-prene, 488; Armstrong, 520.

B. Joint Sealant for Fiberglass Insulation: Foster Products Division, 30-45; Childers, CP-30; Epolux, 670.

C. Vapor Barrier Coating: Foster Products Division, 30-35; Childers, CP-30; Epolux, 670.

D. Cement:

1. Insulating Cement: ASTM C195, asbestos free.
2. Finishing Cement: ASTM C449/C449M.

E. Reinforcing Membrane:

1. Polyester Cloth: 8 x 8 mesh per sq. in., 0.7 oz. per sq. yd.; Foster Products Division, Mast-a-fab.
2. Glass Yarn Cloth: 20 x 20 mesh per sq. in.; Johns-Manville, Duramesh fabric.

F. Sealing Tape: Vapor barrier, color matching, of same material as the pipe or fitting cover to which applied; as manufactured by Arno Inc., Compac Corp., Fasson Adhesive Co.; or as recommended by the manufacturer of the jacket material to which applied.

G. Banding Wire: Steel, 20 gauge, galvanized; annealed.

H. Thumb Tack Fastener: Stainless steel, with serrated shank.

I. Insulation Inserts (for Hangers and Supports):

1. Inserts, High Density Insulation for use with Fibrous Glass Insulation:

a. Cold Service Piping:
i. Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
b. Hot Service Piping:
i. Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
ii. Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.

3. Inserts for use with Elastomeric Foam Insulation only:
a. Cold and Hot Service Piping:
i. Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.

J. Wood Blocks: Hardwood, preservative treated; 1" wide, 3" minimum length; inner and outer surfaces contoured to fit the curvature of the pipe, and insulation shield. Wood blocking is not acceptable for use on heating systems with fiberglass insulation, and will require removal if used.

K. Wood Dowel Plugs: Hard wood, preservative treated.

L. Wood Preservative: Pentachlorophenol, 5% solution, 3 minute dip.

PART 3 EXECUTION

3.01 PREPARATION

A. Do not install insulation until the piping Work has been tested and accepted.

B. Clean and dry all Work to be insulated prior to applying insulation.

3.02 INSTALLATION, GENERAL

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, except as specified otherwise.

3.03 INSTALLATION OF FIBERGLASS INSULATION

A. Seal jacket longitudinal flap with vapor barrier jacket adhesive. Rub out all wrinkles and smooth excess sealant flush with outer surface of jacket.

B. Apply a coating of vapor barrier jacket adhesive to butt ends of each section of insulation to be joined, and apply butt strips in like manner as above. Apply butt strips to overlap 1-1/2" on each side of the sections joined.

C. PVC/Fiberglass Fitting Insulation: Tuck the ends of the pre-cut insulation batt snugly into the throat of the fitting, tuft and tuck-in the edges adjacent to the pipe insulation. Install fitting cover and seal as follows:

1. Cold Service Insulation: Seal the overlap in the throat of the fitting cover, and the butt joint of the cover with the adjacent pipe insulation, with vapor barrier mastic and 2" wide sealing tape (a product of the fitting cover manufacturer).

Extend the tape 1" over the adjacent pipe insulation and overlap upon itself at least 2" on the downward side.

2. Hot Service Insulation: Secure the cover with staples, thumb tack fasteners, or sealing tape.

D. Pre-Molded and Miter Cut Fitting Insulation: Insulate to the same thickness as the adjoining pipe insulation. Apply joint sealant to the mating edges of the sections, and to the butt joint. Secure sections together with banding wire; bend twisted ends into the insulation. Apply a leveling coat of insulating cement to fill the voids and smooth irregularities.

1. Cold Service Insulation: Cover fitting insulation with two 1/8" thick applications of vapor barrier coating, with a layer of reinforcing membrane bedded between coats. Lap membrane at least 2" over itself, and the adjacent pipe insulation. Apply a 6 ounce canvas jacket over the fitting, secured with adhesive. Lap canvas at least 2" over itself, and the adjacent pipe insulation.
   a. Omit canvas on concealed installations.

2. Hot Service Insulation: Apply a 6 ounce canvas jacket to the fitting insulation, secured with adhesive. Lap canvas at least 2" over itself.
   a. Omit canvas on concealed installations.

E. Vapor Stop for Cold Service Insulation:

1. Pipe Insulation: At 21 foot intervals of horizontal, and 9 foot intervals of vertical pipe insulation, also at each fitting insulated with pre-molded or miter cut fitting insulation, apply a 1/16" thickness of vapor barrier coating to the butt end, and 2" into the bore of each joining section before assembling.
2. Insulation Termination; Metal to Insulation Joints; Protrusions Through Insulation:
   a. Apply a vapor barrier coating to completely seal the joint and extend over adjacent insulation and metal a maximum of 3 inches.
   b. Embed reinforcing membrane into the coating, covering the complete coated surface; smooth out wrinkles.
   c. Apply a heavy application of vapor barrier coating over the entire surface, leaving a large bead or fillet at the joint between metal and insulation.

F. Insulated Piping Exposed to view in finished spaces:
1. Provide PVC pipe and fitting jacketing, from 8’-0” aff or finished ceiling (which ever is higher) down to point of concealment.
2. Provide aluminum pipe and fitting jacketing, from 8’-0” aff or finished ceiling (which ever is higher) down to point of concealment.

G. Insulated Piping installed exterior to the building, exposed to the elements:

1. Pipe supports shall not be in direct contact with pipe, supports must to the exterior of the insulation and jacketing.

2. Provide continuous PVC pipe and fitting jacketing, caulked / sealed weather tight, from exit point of building to termination point (to include termination connections).

3. Provide continuous Waterproof Membrane jacketing on insulated pipe and fittings with insulation OD is 6" or larger, from exit point of building to termination point (to include termination connections).

4. Provide continuous Aluminum pipe and fitting jacketing, caulked / sealed weather tight, from exit point of building to termination point (to include termination connections).

3.04 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive. Where the slip-on technique is not possible, slit the insulation and install; re-seal with adhesive, making sure the mating surfaces are completely joined.

B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.

1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation.

C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.

D. Insulated Piping installed exterior to the building, exposed to the elements:

1. Pipe supports shall not be in direct contact with pipe, supports must to the exterior of the insulation and jacketing.

2. Apply two coats of weatherproof mastic, on piping where the insulation OD is 3" or less.

3. Provide continuous PVC pipe and fitting jacketing on piping where the insulation OD is 4" or larger, caulked / sealed weather tight, from exit point of building to termination point (to include termination connections).

4. Provide continuous Waterproof Membrane jacketing on insulated pipe and fittings with insulation OD is 6" or larger, from exit point of building to termination point (to include termination connections).

5. Provide continuous Aluminum pipe and fitting jacketing, caulked / sealed weather tight, from exit point of building to termination point (to include termination connections).

3.05 INSTALLATION AT HANGERS

A. Reset and realign hangers and supports if they are displaced while installing the piping insulation.

B. Direct hanger or clamp contact of pipe for hot or cold piping is not allowed.

C. Fiberglass Insulation: Install high density insulation filler pieces, at all points of support, between pipe insulation shields and pipe or tubing on pipe or tubing 2” and larger. Do not install high-density insulation filler pieces on piping or tubing scheduled to have steel saddles. Install filler pieces of the same thicknesses as adjoining pipe insulation and 2" longer than the insulation shield of the following materials:

1. Install high density molded polyurethane or high-density polystyrene filler pieces, for pipe or tubing insulated with fiberous glass.

D. Flexible Elastomeric Foam Insulation: Install wood blocking or wood dowel plug filler pieces of the same thickness as the insulation. Slot the insulation, insert the filler pieces between the pipe and insulation shield, and secure in place with adhesive. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
Thru 1½"	2 dowel plugs	6 o'clock; in tandem
2" thru 4"	1 block 2 dowel plugs	6 o'clock, and 4&8 o'clock, respectively
6" thru 8"	2 blocks 4 dowel plugs	6 o'clock; in tandem and 4&8 o'clock; in tandem

3.06 INSULATION SCHEDULES

A. General: Provide insulation as scheduled below, insulate all HVAC systems provided in this project in compliance with NYS Energy Code. Where the insulation scheduled or noted in the construction documents exceeds the Energy Code, the greater requirement shall be provided. HVAC Systems provided require insulation per the Energy Code, but not indicated in the schedule below, shall be insulated as part of this project..

APPLICATION	PIPE SIZE	TYPE	MINIMUM THICKNESS	ADD’L
Hot Water (HWS & HWR)	1-1/4” or less	A	1½”	
	1-1/2” and above	A	2”	
Chilled Water (CWS & CWR)	1-1/4” or less	A or B	½”	
	1-1/2” and above	A or B	1”	
Condensate Drain (CD)	1-1/4” or less	A or B	1/2”	
	1-1/2” and above	A or B	1”	
Refrigerant	1-1/4” or less	B	1½”	
	1-1/2” and above	B	2”	

Insulate all cold and hot service equipment in accordance with the schedule, except the items listed below:

A. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves; back pressure valves.

B. Flexible connectors.
C. Piping buried in the ground, unless otherwise specified herein.
D. Items installed by others, unless otherwise specified herein.

B. Install all cold and hot service insulation intact through pipe sleeves, and openings in building construction, maintaining the vapor barrier integrity of the system.

C. Insulate valve bodies up to but not including the packing nuts.

D. Flanges and mechanical couplings and fittings (grooved fittings) shall be insulated with the insulation thickness specified for that system. Provide molded PVC fitting on all grooved fittings.

E. Coordinate with the equipment manufacturers requirements, provide field insulated equipment components or system components as recommended (IE: refrigerant line, boiler headers, cross over piping, etc) per manufacturer.

F. Insulation Options: Select only one of the first 3 options for fiberglass pipe and/or equipment insulation. Option 4 may be used for temperatures to 200 degrees F and on sizes of 2 inches and under. Use fiberglass on pipe and equipment sizes of 2-1/2 inches and larger. Do not inter mix insulation types on individual runs of piping.
1. Option 1: Fiberglass pipe and/or equipment insulation, with pre-molded fitting insulation.
2. Option 2: Fiberglass pipe and/or equipment insulation, with PVC/fiberglass fitting insulating system.
3. Option 3: Fiberglass pipe and/or equipment insulation, with miter cut fitting insulation.
4. Option 4: Flexible elastomeric foam pipe and/or equipment insulation, with miter cut fitting insulation.

3.01 FIELD QUALITY CONTROL

A. Field Samples: The Owner may at their discretion, take field samples of installed insulation for the purpose of checking materials and application. Re-insulate sample cut areas.

END OF SECTION 230719

SECTION 230924
MODIFICATIONS TO DIRECT DIGITAL BUILDING CONTROL SYSTEM

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Electrical Materials and Methods: Section 260501

1.02 DESCRIPTION OF EXISTING SYSTEM

A. The existing system is a Siemens BMS system.

1.03 MODIFICATIONS TO EXISTING SYSTEM

A. Add new rooftop hvac units and appurtenances.

1.04 SUBMITTALS

A. Preliminary Submittal: Existing system test report.

B. Submittals Package: Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.

C. Shop Drawings:
   1. Composite wiring and/or schematic diagrams of the modifications as proposed to be installed (standard diagrams will not be acceptable).

D. Product Data:
   1. Catalog sheets, specifications and installation instructions.
   2. Bill of materials.
   3. Detailed description of system operation.

E. Quality Control Submittals:
   1. Company Field Advisor Data: Include:
      a. Name, business address and telephone number of Company Field Advisor secured for the required services.
      b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
      c. Services and each product for which authorization is given by the Company, listed specifically for this project.

F. Contract Closeout Submittals:
   1. System acceptance test report.
   2. Certificate: Affidavit, signed by the Company Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
   3. Operation and Maintenance Data:
      a. Deliver 2 copies, covering the installed products, to the Owner. Include:

1) Operation and maintenance data for each product.
2) Complete point to point wiring diagrams of entire system as installed. Number all conductors and show all terminations and splices. (Numbers shall correspond to markers installed on each conductor.)

1.05 QUALITY ASSURANCE

A. Company Field Advisor: Secure the services of a Company Field Advisor from the Company of the existing system for a minimum of 24 working hours for the following:
   1. Render advice and witness test of existing system.
   2. Render advice regarding modifications to the system.
   3. Assist in reprogramming of the system.
   4. Witness final system test and then certify with an affidavit that the modifications were installed in accordance with the contract documents and are operating properly.

PART 2 PRODUCTS

2.01 CONTROL COMPONENTS

The following is a list of required devices, refer to the drawings for required quantities and submit components for approval which are compatible with the existing system.

A. Electronic Analog Sensors:

B. Binary Sensors:

C. Pneumatic Sensor/Controllers:

D. Field Panels and Points:

E. Electric Power Control Devices:

F. Damper Motors & Accessories:

G. Valves:

2.02 MARKERS AND NAMEPLATES

A. Markers: Premarked self-adhesive; W.H. Brady Co.'s B940, Thomas and Betts Co.'s E-Z Code WSL self-laminating, Ideal Industries' Mylar/Cloth wire markers, or Markwick Corp.'s permanent wire markers.

B. Nameplates: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
   1. Phenolic: Two color laminated engraver's stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).

2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

2.03 WIRING

A. See Section 260501.

2.04 ACCESSORIES

A. Include accessories required for the modifications to perform the functions specified and indicated on the drawings.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Test of Existing System:
1. Prior to modifying the system, test portions of the existing system to ascertain their operating condition. Specifically, test:
   a. Active points which will be modified.
   b. Primary operators station (POS) and distributed control processor (DCP) functions associated with the modifications.
2. Prepare a written report for the Owner indicating the repairs required, if any, to make the existing system function properly.
3. Repairs to the existing system are not included in the Work unless requested by Order on Contract.

3.02 INTERRUPTIONS TO EXISTING SYSTEM

A. Maintain the existing system in its present condition to the extent possible while installing new Work.

B. Prior to making changes relative to the existing system, notify the Owner and have procedures approved.

3.03 INSTALLATION

A. Install the Work in accordance with the Company's printed instructions unless otherwise indicated.

B. Reprogram the system to include new sensor and control points and update existing system program to include changes and additions requested by facility
1. Obtain from the facility personnel through the Owner, a list of desired system program changes, additions, etc.

C. Identification, Labeling, Marking:

1. Identification of Circuits: Identify wires, cables, and tubing by system and function in interconnection cabinets, POSs and DCPs to which they connect with premarked, self-adhesive, wraparound type markers. Designations shall correspond with point to point wiring diagrams.

3.04 FIELD QUALITY CONTROL

A. Preliminary System Test:
   1. Preparation: Have the Company Field Advisor adjust the completed system and then operate it long enough to assure that it is performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in a suitable condition to conduct an acceptance test.
      b. Checking and adjusting equipment.

B. System Acceptance Test:
   1. Preparation: Notify the Owner at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
   2. Make the following tests:
      a. Test system operational functions associated with the modifications.
      b. Test each monitor and control device connected or added under this project.
   3. Supply all equipment necessary for system adjustment and testing.
   4. Submit written report of test results signed by Company Field Advisor and the Owner. Mount a copy of the written report in a plexiglass enclosed frame assembly adjacent to the POS.

END OF SECTION

SECTION 230993

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes control sequences for HVAC equipment.

B. Provide labor, materials, tools, machinery, equipment, and services necessary to satisfy the sequence of operations specified herein. Coordinate the work with other trades to ensure complete operations of the controls system.

C. Comply with ASHRAE Standards 90.1 and 62.1 as referenced by the Current Code, as well as applicable requirements of the Building Code and other relevant codes.

D. Control sequences shall conform to the requirements of ASHARE Guideline 36-2021 – High Performance Sequences of Operation for HVAC systems.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – SEQUENCE OF OPERATION

3.01 GENERAL

A. For each system listed provide direct digital control to satisfy the sequence of operation as stated in this section.

B. In addition to the requirements of this section, comply with ASHRAE Guideline 36. Provide devices that are pre-programmed with Guideline 36 sequences where available including the following:
1. VAV air handling systems and terminal units.
2. Heating hot water plants.
3. Chilled water plants.
4. Fan coil units.

C. Power Fail/Auto Restart

1. Upon the restoration of power following a power loss, the energy management control system (EMS) or Building Management System (BMS) shall analyze the status of all controlled equipment, compare it with normal programmed scheduling and turn equipment on or off as necessary to resume normal operations.
2. The EMS shall provide an orderly, staggered and predefined scheduling of return-to-normal operation of controlled equipment. The order in which equipment (or groups of equipment) is started, along with the time delay between starts, shall be user definable.

D. Fire Alarm Shut Down: In an alarm condition, the Fire Alarm system shall shut down fans through direct interlock. The EMS shall not shut down the fans. The EMS contractor shall ensure that dampers and valves position to their fail-safe positions.

E. All suggested setpoints and settings shall be adjustable.

F. Provide lockable, tamper-proof, clear plastic protective guards on all room temperature sensors and thermostats located in public spaces (vestibules, corridors, locker rooms, auditoriums, kitchens, cafeterias, etc.). Provide temperature sensors installed under flush mounted protective plates in bathrooms. Provide metal protective guards on all room temperature sensors and thermostats located in gymnasiums, mechanical equipment rooms, shipping and receiving areas, etc. (except for wireless sensors which shall use impact-resistant plastic guards).

G. For all analog measurements provide high and low limit and fault alarm indication. For all fans, pumps, etc., provide status alarm indication.

H. Provide indication of system modes: i.e., Occupied, Unoccupied, Warmup, Cooldown, Pre-Occupancy Purge, Post Occupancy Flush, etc. Differentiate as appropriate for all systems controlled or interfaced to.

I. All analog, binary and time variables and point information and adjustments shall be accessible via the OWS, web browser, etc.

J. All adjustment and acknowledgment permissions shall be password-level dependent.

K. Wherever variable speed operation for a motor is specified or required to satisfy the sequence of operations, provide motors and controls capable of variable speed operation. Provide electronically commutated motors (ECM) where available or when ECMs are not an option due to lack of availability of motor size, provide NEMA premium, inverter duty motors with variable frequency drives.

L. Replace existing controls, thermostats, actuators, etc., with new devices as necessary for incorporation into the existing EMS control system.

3.02 CLASSROOM AND LOCKER ROOM UNITS (G1, G2, G3, K1, K2)

A. The AHU is a variable volume, heating, cooling and ventilating unit that will operate as a 100% outdoor unit. The unit has supply and return fans with variable frequency drives, filter mixing box, outdoor, return and exhaust air dampers, hot water/glycol heating coil with 2-way control valve and chilled water cooling coil with 2-way control valve. A wall-mounted space temperature sensor with override button (limit 2 hour reset) shall be mounted in each of the classrooms as shown on the drawings.

B. The EMS shall use current sensors to confirm the fans are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command. Should a fan fail in its operation the unit operation shall be disabled.

C. On unit startup in any operational mode, the fans shall start at minimum speed. The EMS shall slowly ramp the drives to the required control settings to prevent system instability on startup.

D. Warm-up/Cooldown: The Optimal Start-Stop control algorithm shall automatically determine the amount of early start-time required to have the lowest space temperature at set point when occupied mode begins during the heating season below 65°F, or to have

the warmest space temperature at set point when occupied mode begins during the cooling season above 70°F. For warm-up mode, the unit shall start and run on full return air. The heating coil control valve shall modulate to maintain the supply air temperature as reset from 55°F-60°F as the lowest space temperature varies from its occupied set point of 72°F. For cooldown mode, the unit shall start and run on full outdoor air. The cooling control valve shall modulate to maintain the supply air temperature at set point as reset from 55°F-60°F as the warmest space temperature varies from its occupied set point of 72°F.

E. Occupied - Fan Control: The unit supply and return fans shall run continuously unless manually or safety stopped. A static pressure sensor two-thirds down the supply duct shall monitor the duct static pressure. The supply fan variable frequency drive shall be controlled to maintain a 1.0 in. w.c. set point at the static pressure sensor. The return fan variable frequency drive shall be controlled to maintain a speed differential less than the supply fan. Coordinate design settings with balancing contractor as required.

F. Occupied - Temperature Control: The unit shall maintain the supply air temperature set point based on the degrees above or below set point of the rooms supplied by the unit. The supply air temperature shall be reset according to the higher of the following reset schedule:

CLASSROOMS HIGHEST COOLING DEMAND	SUPPLY AIR TEMPERATURE SET POINT
0%	60°F
100%	55°F

The EMS shall modulate heating coil control valve and cooling coil control valve in sequence to maintain the supply air temperature at setpoint.

G. Unoccupied Mode: The unit shall be off. The outside and exhaust air dampers and cooling coil control valve shall be closed. The return air damper and heating coil valve shall be open. If the lowest space temperature drops below the night set back set point of 62°F, the unit shall start and run on full heating until the space temperature rises 2°F above the night set back set point. The unit can be placed into the occupied mode of operation for up to a 2-hour period of time by depressing the button on the face of any of the classroom space temperature sensors. This override can be canceled by depressing the button again.

H. Above its setting, a differential pressure switch shall signal a dirty filter alarm condition to the EMS.

I. Provide a low limit thermostat serpentined across the downstream face of the unit heating coil. If the air temperature as sensed by the thermostat drops below its setpoint of 38°F, the unit fan shall be de-energized and the alarm condition indicated at the EMS. The heating and cooling coil control valves shall open.

J. Smoke detectors in the unit supply and return air streams shall signal an alarm condition to the building fire alarm system upon activation. The fire alarm system shall stop the unit. The alarm condition shall be indicated at the EMS.

K. Whenever the unit is off the outside and exhaust air dampers shall be closed. The return air damper and heating coil control valve shall be open. The cooling coil control valve shall be closed except in a low limit alarm condition as described above.

L. Point List

1. Supply fan VFD start/stop command
2. Supply fan status
3. Supply fan VFD speed command
4. Supply fan VFD speed feedback
5. Supply fan VFD fault alarm condition
6. Return fan VFD start/stop command
7. Return fan status
8. Return fan VFD speed command
9. Return fan VFD speed feedback
10. Return fan VFD fault alarm condition
11. Heating valve position command
12. Heating valve position feedback
13. Cooling valve position command
14. Cooling valve position feedback
15. Outside, return & exhaust dampers position command (each damper)
16. Outside, return & exhaust dampers position feedback (each damper)
17. Mixed air temperature
18. Heating coil discharge air temperature
19. Cooling coil discharge air temperature
20. Downstream static pressure
21. Return air temperature
22. Low limit thermostat alarm
23. Dirty filter alarm
24. Supply air smoke detector alarm
25. Return air smoke detector alarm

3.03 ADMINISTRATION AREA UNIT (H1)

A. The AHU is a variable volume, heating, cooling and ventilating unit with supply and return fans with variable frequency drives, filter mixing box, economizer and exhaust air dampers, hot water/glycol heating coil with 2-way control valve, chilled water cooling coil with 2-way control valve and an outside air flow measuring station. A wall-mounted space temperature sensor with override button (limit 2 hour reset) shall be mounted in each music room as shown on the drawings.

B. The EMS shall use current sensors to confirm the fans are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command. Should a fan fail in its operation the unit operation shall be disabled.

C. On unit startup in any operational mode, the fans shall start at minimum speed. The EMS shall slowly ramp the drives to the required control settings to prevent system instability on startup.

D. Warm-Up/Cooldown Mode: The Optimal Start-Stop control algorithm shall automatically determine the amount of early start-time required to have the space temperature at set point when occupied mode begins. The unit shall start and initially run on full return air. For warm-up mode the heating coil control valve shall modulate to maintain the supply air temperature as reset from 55°F-60°F as the space temperature varies from its occupied set point of 72°F. For cooldown mode, if the supply air

temperature is above its set point with the heating control valve closed and the outside air enthalpy is less than the return air enthalpy, the economizer and exhaust air dampers and cooling control valve shall modulate in sequence to maintain the discharge set point. If the outside air enthalpy is greater than the return air enthalpy and chilled water is available, the dampers shall be positioned to full return air and the cooling control valve shall modulate to maintain the supply air temperature at set point. The supply fan variable speed drive shall be controlled to maintain a 1.0 in. w.c. set point at the downstream static pressure sensor. The return fan variable frequency drive shall be controlled to maintain a speed differential less than the supply fan. Coordinate design settings with balancing contractor as required.

E. Occupied - Fan Control: The unit supply fan shall run continuously unless manually or safety stopped. A static pressure sensor two-thirds down the supply duct shall monitor the duct static pressure. The supply fan variable speed drive shall be controlled to maintain a 1.0 in. w.c. set point at the static pressure sensor. The return fan variable frequency drive shall be controlled to maintain a speed differential less than the supply fan. Coordinate design settings with balancing contractor as required.

F. Occupied - Temperature Control: The outside air damper shall be modulated to maintain the minimum outside air ventilation flow requirements as calculated below. The unit shall maintain a supply air temperature set point based on the average degrees above or below set point of all the VAV boxes supplied by the unit. The supply air temperature shall be reset according to the higher of the following reset schedule:

ADMIN AREA HIGHEST COOLING DEMAND	SUPPLY AIR TEMPERATURE SET POINT
0%	60°F
100%	55°F

The heating coil control valve shall modulate to maintain the supply air temperature at setpoint. If the supply air temperature continues to rise above its set point with the heating control valve closed and the outside air enthalpy is less than the return air enthalpy, the economizer and exhaust air dampers and the cooling control valve shall modulate in sequence to maintain the discharge set point. If the supply air temperature continues to rise with the heating control valve closed, and the outside air enthalpy is greater than the return air enthalpy and chilled water is available, the economizer and exhaust air dampers shall be positioned to the minimum outdoor air position and the cooling control valve shall modulate to maintain the supply air temperature at set point.

G. Unoccupied Mode: The unit shall be off. The outside and exhaust air dampers and cooling coil control valve shall be closed. The return air damper and heating coil valve shall be open. If the lowest space temperature drops below the night set back set point of 62°F, the unit shall start and run on full heating until the space temperature rises 2°F above the night set back set point. The unit can be placed into the occupied mode of operation for up to a 2-hour period of time by depressing the button on the face of any of the administration area space temperature sensors. This override can be canceled by depressing the button again.

H. Above its setting, a differential pressure switch shall signal a dirty filter alarm condition to the EMS.

I. Provide a low limit thermostat serpentined across the downstream face of the unit heating coil. If the air temperature as sensed by the thermostat drops below its setpoint of 38°F,

the unit fan shall be de-energized and the alarm condition indicated at the EMS. The heating and cooling coil control valves shall open.

J. Smoke detectors in the unit supply and return air streams shall signal an alarm condition to the building fire alarm system upon activation. The fire alarm system shall stop the unit. The alarm condition shall be indicated at the EMS.

K. Whenever the unit is off the outside and exhaust air dampers shall be closed. The return air damper and heating coil control valve shall be open. The cooling coil control valve shall be closed except in a low limit alarm condition as described above.

L. Outside Air Reset: - The minimum outside air requirement shall be reset based on the critical space requirements of the NYS Mechanical Ventilation Code.

1. The air handler outdoor air damper shall be controlled to deliver required outdoor airflow to each individual VAV zone at all load conditions. The minimum outdoor airflow setpoint shall be determined using equation M4-1 in the NYS Mechanical Ventilation Code M403. The actual outdoor airflow shall be sensed at the outdoor air flow station.
2. The ventilation fraction (design ventilation airflow for the zone divided by primary airflow) shall be continuously calculated for each VAV terminal zone. Continuously determine the maximum zone ventilation fraction (Z), the sum of the outdoor air requirements for all VAV terminal zones (Von) and the total supply airflow (Vst). This information shall be used in Equation M4-1 to calculate the minimum required outdoor airflow (Vot). The minimum required outdoor airflow (Vot) setpoint shall be regularly recalculated based on the prevailing VAV zone conditions and occupancy. All VAV zone outdoor air requirements will be predetermined as shown on the VAV box schedule and remain constant during the occupied time of the building.

   Equation M4-1

   $Y = X / (1+X-Z)$

   Y = Vot/Vst = Corrected fraction of outdoor air in system supply.

   X = Von/Vst = Uncorrected fraction of outdoor air in system supply.

   Z = Voc/Vsc = Fraction of outdoor air in critical space.

   The critical space is that space with the greatest required fraction of outdoor air in the supply to this space.

   Vot = Corrected total outdoor airflow rate.

   Vst = Total supply flow rate, i.e., the sum of all supply for all branches of the system.

   Von = Sum of outdoor airflow rates for all branches on system.

   Voc = Outdoor airflow rate required in critical spaces.

Vsc = Supply flow rate in critical space.

3. If at any time, the outside air fraction (Y) gets to 0.75, the EMS shall increase the total supply air in the critical zone that is driving the outside air fraction to 0.75, and recalculate the outside air percentage requirement based on equation M4-1, until the outside air fraction falls below 0.75.

M. Point List (Typical)

1. Supply fan start/stop command
2. Supply fan status
3. SF VFD position command
4. SF VFD position feedback
5. SF VFD fault alarm
6. Return fan VFD start/stop command
7. Return fan status
8. Return fan VFD speed command
9. Return fan VFD speed feedback
10. Return fan VFD fault alarm condition
11. Heating valve position command
12. Heating valve position feedback
13. Cooling valve position command
14. Cooling valve position feedback
15. Outside, return & exhaust dampers position command (each damper)
16. Outside, return & exhaust dampers position feedback (each damper)
17. Mixed air temperature
18. Heating coil discharge air temperature
19. Cooling coil discharge air temperature
20. Downstream static pressure
21. Outdoor airflow CFM
22. Outdoor air temperature
23. Outdoor air humidity
24. Return air temperature
25. Return air humidity
26. Low limit thermostat alarm
27. Dirty filter alarm
28. Supply air smoke detector alarm
29. Return air smoke detector alarm

3.04 ADMINISTRATION AREA ROOM CONTROLS - VAV BOX w/HW REHEAT (TYPICAL)

A. VAV terminal boxes with reheat coils shall perform airflow tracking and temperature control. Refer to the VAV box schedule for all actual maximum occupied CFM, minimum occupied CFM and minimum reheat CFM set point values.

B. The VAV supply air box is pressure independent and adjusts damper position in response to supply duct velocity pressure changes.

C. Occupied: Upon a drop in space temperature below the 72°F occupied set point, the VAV box damper shall be modulated to the minimum airflow position. Upon a further drop in space temperature the reheat coil hot water control valve shall be modulated towards flow through the reheat coil. As the space temperature set point becomes

satisfied, the reverse shall occur. Upon a rise in space temperature above set point, the VAV box damper shall modulate towards the maximum flow position.

D. Unoccupied: The VAV box damper shall be positioned for minimum airflow. Upon a drop in space temperature below the 62°F night set back set point, the VAV box reheat coil hot water control valve shall be modulated towards flow through the reheat coil. As the space temperature set point rises above the night set back set point, the reverse shall occur. The air handling unit serving the space can be placed into the occupied mode of operation for a user adjustable period of time by depressing the button on the face of any VAV space temperature sensor. This override can be canceled by depressing the button again.

E. Point List (Typical)

1. Space temperature
2. Supply air temperature
3. Reheat valve command
4. VAV damper command
5. Space sensor unoccupied override command status

3.05 DEDICATED OUTSIDE AIR SYSTEM HEAT PUMP WITH ENERGY RECOVERY WHEEL (DOAS.LR, DOAS.WR)

A. The HRU has supply and return fans with variable frequency drives, filter sections, outdoor and exhaust air dampers, hot water/glycol heating coil with 2-way control valve and DX cooling/heating with stages. The HRU provides conditioned air to the classroom fan coil units.

B. Whenever the unit operates the fans shall run at design speed as determined by the balancing contractor.

C. Whenever the unit is indexed to start the outside air and exhaust air dampers shall open. A limit switch on each damper sensing damper blade position shall be hardwire interlocked to allow the respective supply and exhaust fan to start. Interlock shall be hardwired to function whether the fan is started through the EMS or at its starter.

D. The EMS shall use current sensors to confirm the fans are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command. Should a fan fail in its operation the unit operation shall be disabled.

E. The energy recovery wheel shall operate through its self-contained controls.

F. Occupied Mode: When the classrooms index to occupied mode the unit shall be in occupied mode. The unit shall run continuously. The EMS shall modulate the heating coil control valve and cooling coil control valve in sequence to maintain 70°F discharge air temperature.

G. Unoccupied Mode: When the classrooms index to unoccupied mode the unit shall be in unoccupied mode. The unit shall be off. The outside and exhaust air dampers and cooling coil control valve shall be closed. The heating coil valve shall be open. If any classroom is placed into occupied mode the HRU serving that classroom shall start and

operate in occupied mode.

H. Above its setting, a differential pressure switch shall signal a dirty filter condition to the EMS. The EMS shall indicate the alarm condition. Applies to both supply and exhaust air filters.

I. Provide a low limit thermostat serpentined across the downstream face of the heating coil. If the air temperature as sensed by the thermostat drops below its setpoint of 38°F, the unit fan shall be de-energized and the alarm condition indicated at the EMS. The heating and cooling coil control valves shall open.

J. Smoke detectors in the unit supply and return air streams shall signal an alarm condition to the building fire alarm system upon activation. The fire alarm system shall stop the unit. The alarm condition shall be indicated at the EMS.

K. Whenever the unit is off the outside and exhaust air dampers shall be closed. The heating coil control valve shall be open. The cooling coil control valve shall be closed except in a low limit alarm condition as described above.

L. Point List

1. Supply fan VFD start/stop command
2. Supply fan status
3. Return fan VFD start/stop command
4. Return fan status
5. Heating valve position command
6. Heating valve position feedback
7. Cooling valve position command
8. Cooling valve position feedback
9. Energy recovery wheel supply air leaving temperature
10. Heating coil discharge air temperature
11. Cooling coil discharge air temperature
12. Outdoor air temperature
13. Return air temperature
14. Exhaust air temperature
15. Low limit thermostat alarm
16. Dirty filter alarm (each filter set)
17. Supply air smoke detector alarm
18. Return air smoke detector alarm

DEDICATED OUTDOOR AIR SYSTEM (DOAS) CONSTANT AIR VOLUME UNIT HEAT PUMP

A. General System Overview

1. Mechanical System Summary: DOAS units shall be provided with supply and exhaust fans (with variable frequency drives), outdoor air dampers, back-up electrical redundancy heating (to guarantee maintaining the discharge air setpoint should the DX heating fail or be unable to maintain discharge air temperature setpoint on a cold day), exhaust dampers, DX-cooling/heating stages, and modulating hot-gas reheat. The DOAS rooftop unit shall operate in various modes; System-OFF, Pre-Occupied Morning Purge, Unoccupied Nighttime Purge, or Occupied Modes.

2. Safety Devices. Safeties shall be in force at all times and all modes of operation, including all operating modes of the VFDs including VFD bypass operation.

   a. Supply Duct Overpressure Control: If the static pressure in the supply duct exceeds the positive static pressure switch setpoint for any reason, the supply fan shall stop and DOAS shall remain in the System-OFF Mode until the safety pressure switch is manually reset. After the alarm is cleared, the DOAS shall resume its normal operation according to the appropriate mode. A change-of-state alarm shall be generated at the SOC. Note that this fan safety shall be hardwired to shut the fan off in all modes of operation.

   b. Exhaust Duct Suction Pressure Control: If the static pressure in the exhaust duct exceeds the negative static pressure switch setpoint, the exhaust fan shall stop and the DOAS shall remain in the System-OFF Mode until the safety pressure switch is manually reset. After the alarm is cleared, the DOAS shall resume its normal operation according to the appropriate mode. A change-of-state alarm shall be generated at the SOC. Note that this fan safety shall be hardwired to shut the fan off in all modes of fan-control operation.

   c. Clogged Filter Alarm: There shall be an indicating differential pressure sensor installed across the filters which shall indicate the combined pressure drop across the filters. A clogged filter alarm shall be generated at the SOC/HMI when the pressure drop exceeds the combined pressure drops as recommended by the filter manufacturer for replacement.

   A. d. Per Section MC 307.2.3, for curb mounted units (not applicable for dunnage mounted units) where the primary drain pan is not provided with auxiliary drain line or an auxiliary drain pan is not provided with an auxiliary drain line and where an auxiliary drain pan is provided with a condensate water level detection device in the auxiliary drain pan, a hard-wired water-level detection device located in the auxiliary pan or primary pan shall shut off the equipment served prior to overflow of the auxiliary pan.

3. Fire Alarm Shut Down: This sequence of operation shall be in force at all times and under all modes of operation.

   a. The Fire Alarm contractor shall furnish and the mechanical contractor shall install the smoke detector(s) to shut down the system upon sensing smoke. Furthermore, the following shall be provided through Div. 16.

   b. During a fire alarm condition, the Fire Alarm Control Panel (FACP) shall shut down the supply and exhaust fan and the system shall operate and remain in the System-OFF Mode until the alarm condition is cleared. When the unit fans are shut down by a fire alarm condition, all smoke dampers shall close as commanded by the FACP. After the fire alarm shutdown is cleared, all smoke dampers shall be commanded open by the FACP.

   c. Smoke Isolation Dampers: For systems supplying 15,000 cfm or more, smoke isolation dampers shall be provided for both the supply and exhaust ducts. The smoke dampers shall be commanded open against their normally-closed, spring-returned actuators during all non-

emergency operation. Per Section MC 606.4.3, fans or fan systems which have been automatically shut down on activation of an automatic fire detecting device or fire alarm system shall be arranged and equipped so that they do not automatically restart when either the automatic fire detecting device or fire alarm system is reset. The manual means of restarting the fans or fan system shall function independently from the manual resetting of either the automatic fire detecting device or fire alarm system.

d. Fire alarm system activation initiated by manual pull station shall not shut down the unit supply and exhaust fans and shall not close the associated smoke dampers.

e. Per Section MC 606.4.2, fans on systems that recirculate air less than or equal to 2,000 cfm or exhaust fans, shall not be shut down upon manual or automatic activation of the fire alarm system.

f. Fire dampers shall be provided as required at penetrations of fire rated construction.

g. The DOAS OEM shall provide duct Smoke Dampers (SD) with actuators and proof-of-open end-switches. The FACP shall monitor all associated end-switches for proof-of-open on an individual or zone basis. The FACP shall indicate via a FACP mounted LED that a damper or zone of dampers has not proven open. Fire/smoke dampers associated with the post-fire smoke purge system and smoke control systems shall be monitored on an individual basis by the FACP.

4. I/O Points: Provide the I/O points as specified.

B. Operating Modes: The operating modes of the DOAS shall be automatically determined by the combined actions of the DDC Scheduler, the local unit mounted HAND-OFF-AUTO switch; control and safety devices and the Fire Alarm System.

1. Mode Selection and Fan Operation:

a. The operator shall be able to manually select the operating mode through an H-O-A switch (labeled HAND-OFF-AUTO) mounted in the DOAS and wired into the digital controller. In the automatic-position the DOAS is indexed automatically by the DDC Scheduler between the various modes of operation described herein. In the HAND position the RTU shall remain in the Occupied Mode. In the OFF position the RTU shall remain off. Note that the H-O-A switch is not the same as the manufacturer's service switch which shall shutdown the DOAS.

b. When the H-O-A switch is placed into either the "HAND" or the "OFF" position an advisory is generated at the SOC.

c. Exhaust air fan (EF) shall be started and stopped by the DDC scheduler.

d. Summer/Winter Mode Selection: The DOAS unit shall be manually indexed to operate in either the Summer Mode or Winter Mode.

1) If the Summer Mode has been manually enabled and if the outdoor temperature is greater than or equal to 55°F but less than 65°F and the outdoor air enthalpy is less than the exhaust enthalpy, the unit shall be indexed to the Summer Economizer Cooling Mode. If the Summer Mode has been manually enabled and if the outdoor temperature is greater than or equal to 55°F

but less than 65°F and the outdoor air enthalpy is greater than the exhaust enthalpy, the rooftop unit shall be indexed to Summer Mechanical Cooling Mode. If the Summer Mode has been manually enabled and if the outdoor temperature is greater than 65°F, the unit shall be indexed to the Summer Mechanical Cooling Mode with enabled compressors.

2) The system shall have the ability to do a manual Summer/Winter changeover by selection at the SOC. A network variable input shall be able to be sent to the DOAS Unit controller.

e. Fan Acceleration/De-acceleration: When the supply fan and exhaust fans are started, the fans shall be slowly accelerated up to the required speed according to the ramp adjustments in the VFDs. The ramp-up time shall be set to (30) seconds. When the fans are de-energized they shall be de-energized immediately without de-acceleration.

f. Supply and Exhaust Fan Control:

1) The supply fan shall be started and stopped as described in these sequences.

2) During the heating and cooling occupied cycles, the supply fan shall provide the cumulative room fully occupied flow rates. Refer to Article 3.31 whereby ventilation is to be provided 24 hours per day/7 days per week when the Special Ventilation modes are enabled (unless otherwise manually reset at The SOC so the units are returned to the Normal modes of operation).

3) The exhaust fan VFD speed shall be placed under control of the controller to maintain positive pressurization in the non-assemby spaces. The exhaust rate shall be measured by the exhaust air flow monitoring station. Exhaust fan shall maintain proper pressurization with respect to the outdoor air flow. The final setting shall be determined and set by the Test & Air Balancing Contractor. The exhaust flowrate at the central DOAS unit shall be 90% of the room cumulative fully occupied outdoor air intake rate (minus any remote exhausts).

4) Upon proof of supply fan operation, in all modes of fan operation, the control sequence shall proceed according to the appropriate Mode. If the supply fan does not prove ON, a SOC/HMI alarm shall be issued.

2. System-OFF Mode:

a. The rooftop unit supply and exhaust fans shall be OFF; all associated remote exhaust fans shall be OFF; the rooftop unit dampers shall be commanded to their respective fail-safe positions as follows: outdoor air and exhaust air dampers closed, DX-cooling, hot-gas reheat valves and DX heating shall be de-energized. The energy wheel shall not rotate. The back-up redundancy electric coil shall be de-energized.

3. Unoccupied Mode: Refer to Article 3.31 whereby ventilation is to be provided 24 hours per day/7 days per week when the Special Ventilation modes are enabled (unless otherwise manually reset at The SOC so the units are returned to the Normal modes of operation).

    a. Unoccupied Heating Mode: The DOAS unit shall be commanded to the System OFF mode. Unoccupied Night Set Back (NSB) shall be nominal adjustable 55°F plus 0 minus 2°F and shall be maintained by the terminal split or VRF units per the Sequence of Operation as defined in Section 15783, "Split Heat Pump and VRF Systems". In the event of a failure of the terminal units due to associated air cooled condenser failure, the perimeter baseboard units shall provide the required back-up space heating.

    b. Unoccupied Cooling Mode: The terminal split or VRF units mechanical cooling sequences shall only be enabled if the representative room relative enthalpy conditions and outdoor air temperature conditions do not enable the unoccupied nighttime purge sequence by the DOAS units. If the relative enthalpy conditions and outdoor air temperature conditions do not enable the DOAS unoccupied nighttime purge sequence, the DOAS units shall be commanded to be in the System OFF mode. During the unoccupied cooling mode, the terminal split or VRF units shall maintain each terminal space's temperature high-limit (HHL) setpoint at nominal adjustable 85ºF plus 0 minus 2ºF per the Sequence of Operation defined in Section 15783, "Split Heat Pump and VRF Systems".

4. Pre-Occupied Morning Warm-up: The DOAS shall be commanded to the System OFF mode. Pre-occupancy morning warm-up mode shall be required as sensed by each space's local space temperature sensors before the system is indexed from the unoccupied to the occupied mode. The terminal split or VRF units perimeter heating system cycle start time shall be based on the difference between the current local space temperature and the occupied setpoint for optimum start controls. Additionally, per Section 6.4.3.3.3 of ASHRAE 90.1-2016, the control algorithm shall also be a function of the outdoor temperature and the amount of time prior to scheduled occupancy.

    a. When the nominal space temperature is below the adjustable occupied setpoint (72ºF -2ºF) then the warm-up sequence shall be initiated. The DOAS shall remain off until the beginning of the Occupied Mode. The terminal split or VRF units perimeter heating system shall be utilized in the warm up cycle to bring all of the spaces to the nominal adjustable 72ºF setpoint cutoff per the Sequence of Operation as defined in Section 15783, "Split Heat Pump And VRF Systems".

    b. The Warm Up mode shall be terminated when the scheduler places the unit in the scheduled occupied mode, not when the space temperatures rise above the highest nominal adjustable occupied setpoint (72ºF).

5. Pre-Occupied Morning Purge or Unoccupied Nighttime Purge and/or Pre-Occupied Morning Pull-down: Pre-occupancy space cooling by purging shall be required as sensed by the space temperature sensor and relative humidity sensor in the representative space before the system is indexed from the unoccupied mode or pre-occupied mode to the occupied mode. During the unoccupied night time period, the DOAS unit shall be able to start and purge the spaces for a 15 minute period if the outdoor air enthalpy is less than the representative space enthalpy and if the outdoor air temperature equals or exceeds 68°F and then

return to System Off mode. The relative enthalpies will be rechecked in the System Off Mode and the Unoccupied Nighttime purge cycle shall be repeated for a 15 minute period if the outdoor air enthalpy is less than the representative space enthalpy and if the outdoor air temperature equals or exceeds 68°F. Unoccupied Nighttime purge cycle shall be terminated when the system is scheduled to the pre-occupied morning purge or pull down cycle.

a. Pre-Occupied Morning Purge or Unoccupied Nighttime Purge Cycles:

1) The DDC Controller shall calculate the representative space enthalpy from the combination of the space temperature and space relative humidity sensor readings and compare to the broadcast value of the calculated outdoor air enthalpy. If the outdoor air enthalpy is less than the inside enthalpy and if the outdoor air temperature equals or exceeds 68°F, a pre-occupied morning or unoccupied nighttime purge cycle shall be initiated for a (15) minute duration.

A. 2) During the pre-occupied morning or unoccupied nighttime purge cycles, 100% outdoor air shall be introduced into the building to purge the building air before occupancy. The energy wheel shall not rotate (and wheel shall be bypassed if equipped with optional bypass dampers). The outdoor air and exhaust air dampers are to be indexed to their fully open position.

3) The DOAS central air conditioner supply fan shall have DX-cooling locked out until the pre-occupied morning or unoccupied nighttime purge cycles are terminated. The exhaust fan VFD shall be modulated to maintain proper pressurization (nominally 90% of the outdoor air flow minus any remote exhaust). The pre-occupied morning or unoccupied nighttime purge cycles shall be terminated after a 15-minute cycle. The pre-occupied morning purge cycle, if initiated, shall be followed by a pre-occupied pull-down cycle.

b. Pre-Occupied Morning Pull-down Cycle:

1) The terminal split or VRF units mechanical cooling sequences shall only be enabled if the representative space relative enthalpy conditions and outdoor air temperature conditions do not enable the pre-occupied morning purge sequence by the DOAS units. If the representative space relative enthalpy conditions and outdoor air temperature conditions do not enable the DOAS pre-occupied morning purge sequence, the DOAS units shall be commanded to be in the System OFF mode. During the pre-occupied morning pull-down cooling mode, the terminal split or VRF units shall maintain each terminal space's temperature setpoint to nominal adjustable 78ºF plus 0 – 2ºF per the Sequence of Operation defined in Section 15783, "Split Heat Pump and VRF Systems".

Pre-occupied morning pull-down cycle start time shall be based on the difference between each space's current temperature and the occupied temperature setpoint for optimum start controls. Additionally, per Section 6.4.3.3.3 of ASHRAE 90.1-2016, the control algorithm shall also be a function of the outdoor

temperature and the amount of time prior to scheduled occupancy.

2) Each space's pull down cycle shall continue until each space's air temperature is less than or equal to nominal adjustable 78°F plus 0 minus 2°F and then the terminal units shall cycle off. Should each space's temperature rise again during the pull down cycle time period, each space's terminal unit shall be re-enabled and the cycle shall repeat.

The pre-occupied pull down cycle shall be terminated when the scheduler places the DOAS unit and terminal units in the scheduled occupied modes, not when each space's air temperature is at or below nominal adjustable 78˚F plus 0 minus 2˚F.

3) Once the pre-occupied pull-down cycle is terminated by the system being indexed into Occupied Mode, the DOAS unit shall be indexed to temper the ventilation air in the occupied mechanical cooling mode.

6. Occupied Mode: In both the Occupied Heating mode and Occupied Cooling mode, the DOAS unit shall run simultaneously with the terminal split units and terminal VRF units. The DOAS unit energy wheel shall be run at full speed in the Occupied Heating mode and Occupied Cooling mode. The DOAS energy wheel shall not rotate in the Economizer Cooling mode.

For the Occupied Heating and Occupied Cooling modes, space heating and space cooling shall be provided by the terminal split units and terminal VRF units located in each space.

The terminal split units and terminal VRF units shall maintain the following nominal adjustable space setpoint conditions and shall function per the Sequence of Operation as defined in Section 15783, "Split Heat Pump and VRF Systems".

Heating: 72˚F plus 0 minus 2˚F

Cooling: 78˚F plus 0 minus 2˚F

When the DOAS DDC controller is indexed to the Occupied mode, the following occurs.

a. The measured cumulative fully occupied outdoor air flow shall be provided by the supply fan and shall be used to control the exhaust flow. The exhaust flow air flow monitoring station shall monitor the exhaust airflow and send the flow signal to the controller which shall adjust the speed of the exhaust fan by modulating the exhaust fan VFD. Proper pressurization of exhaust flow as compared to the cumulative outdoor air intake flow shall be maintained. Exhaust flow rate shall be 90% of the cumulative outdoor air intake flow minus any remote exhaust.

b. The supply and exhaust flow rate final settings shall be determined by the Test & Air Balancing Contractor.

c. If the fans do not prove ON, an alarm shall be issued to the SOC/HMI.

d. During the Occupied modes, the unit shall run in a 100% outdoor air mode.

e. When indexed to the Occupied Heating mode, the energy wheel shall be commanded to its full speed. The outdoor air and exhaust dampers shall be fully open in a 100% outdoor air mode. The compressors shall be energized for DX tempering and the unit shall be modulated to provide a nominal 65°F (adjustable) discharge air temperature. Should the energy recovery wheel preheating together with the DX heating not be able to provide the required 65°F (adjustable) discharge air temperature at low outdoor ambient temperatures or should the DX heating fail, the back-up redundancy electric coil shall be energized as required to maintain the 65°F discharge air setpoint. The non assembly space split units and VRF units units shall be modulated to provide a nominal 72°F (adjustable) space temperature in each of the spaces.

f. Frost Protection for ERW in Heating Mode:

The microprocessor controller shall activate the frost control method when the outdoor air temperature is less than the manufactuer defined defrost set point and/or the wheel pressure switch is closed due to a high wheel pressure drop due to frost formation. Once the pressure drop decreases below the pressure switch point or the outdoor air temperature rises above the manufacturer defined defrost setpoint, the unit shall resume normal operation. Alternate defrost cycle initiating logic is whenever the energy wheel exhaust leaving air temperature is less than the exhaust air frost control temperature setpoint. Defrost shall be achieved with electric preheater or wheel speed modulation where the wheel slows to allow defrosting to occur to maintain the exhaust leaving air temperature above the exhaust air temperature frost control setpoint. Alternate control routine is to cycle the wheel off for a manufacturer defined defrost cycle time. After the defrost cycle time, the wheel is re-energized to continue normal operation. The controller shall not allow another defrost cycle for a manufacturer defined cycle time.

Frost Protection for Outdoor Coil in Heating Mode:

Coil defrost cycle shall be initiated based on saturated suction temperature, outdoor ambient temperature and outdoor humidity (dewpoint). In the defrost cycle, the heat pump shall be automatically operated in reverse as if in the cooling mode. This action shall warm up the outdoor coil and melt the frost from the coil. In this defrost cycle, the outdoor fan shall be prevented from turning resulting in an accelerated temperature rise of the outdoor coil. The heat pump shall operate in the defrost cycle until the outdoor coil temperature (saturated discharge temperature) reaches it's cancel defrost temperature setpoint or the defrost cycle duration exceeds the manufacturer defined maximum allowable defrost cycle duration. The defrost cycles shall repeat regularly at timed intervals without rapid cycling of the defrost operation. During the defrost cycle, the unit shall be operating and distributing supply air. To prevent cool air from being produced and distributed, the integral auxiliary supplemental electric heating coil shall be engaged at the same time as the defrost cycle. The auxiliary supplemental electric heating coil shall maintain discharge air temperature setpoint (nominally 65°F adjustable) during the defrost cycle.

g. During the Occupied Mechanical Cooling period, exhaust air relative humidity (since it is a proxy for the aggregate relative humidity for all of the spaces) is controlled with indirect dehumidification by keeping the discharge off the DX cooling coils at no greater than 55˚F which should always keep the spaces within the comfort zone as defined in ASHRAE 55-2010. When indexed to the Occupied Mechanical Cooling mode, the energy wheel shall be commanded to its full speed. Mechanical DX cooling units shall be controlled in stages and sequenced to maintain a maximum 55˚F cooling coil discharge temperature. Should the spaces start to overcool as noted by having an exhaust duct temperature at the DOAS unit less than 75˚F even after the terminal split units or terminal VRF units are no longer providing space cooling, the DOAS hot gas reheat valves shall be modulated thus raising the DOAS discharge air temperature above 55˚F as required to avoid any potential overcooling as the discharge air temperature off the DX cooling coil is held to 55˚F maximum. Hot gas reheat shall maintain the duct exhaust air temperature between 76°F and 78°F.

h. During Occupied Economizer Cooling Mode, the DOAS unit shall attempt to maintain a maximum supply duct dry-bulb temperature of 55˚F as sensed by the supply duct temperature sensor. For the Economizer Cooling Mode, the outdoor air temperature shall be greater than or equal to 55˚F but less than 65˚F and the outdoor enthalpy shall be less than the exhaust air enthalpy, so when the unit attempts to hold a 55˚F discharge temperature with the compressors de-energized, it shall open the outdoor air and exhaust dampers fully. The energy wheel shall not rotate (and wheel shall be bypassed if equipped with optional bypass dampers). The actual supplied air temperature to the spaces shall be greater than or equal to 55˚F but less than 65˚F. The exhaust fan VFD shall be modulated to provide an exhaust flow that is 90% of the cumulative outside air intake rate taken in at the central DOAS unit (minus any remote exhausts).

7. Communication:

a. Upon loss of communication with the network, the rooftop unit DDC controller shall operate in the last manually selected seasonal occupied mode (before the loss of communication).

3.06 CORRIDOR UNIT RTU-3 (TYPICAL RTU-4)

A. The RTU is a heating, cooling and ventilating unit with supply fan with variable frequency drive, filter mixing box, economizer and exhaust air dampers, hot water/glycol heating coil with 2-way control valve and chilled water cooling coil with 2-way control valve. A wall-mounted space temperature sensor with guard shall be mounted as shown on the drawings.

B. Whenever the unit operates the fan shall run at design speed as determined by the balancing contractor.

C. The EMS shall use a current sensor to confirm the fans are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command. Should a fan fail in its operation the unit operation shall be disabled.

D. Warm-Up/Cooldown: During the heating season when the EMS places the system into the Warm-Up mode using the Optimum Start Stop (OSS) control algorithm, the unit shall start and the EMS shall modulate the heating coil control valve until the space temperature rises to within the occupied control throttling range. During the cooling season when the EMS places the fan coil unit into the Cooldown mode using the Optimum Start Stop (OSS) control algorithm, the unit shall start and the EMS shall modulate the cooling coil control valve until the space temperature drops to within the occupied control throttling range. The OSS control algorithm shall automatically determine the amount of pre-start time required to have the space temperature at set point when the occupied mode begins.

E. Occupied Mode: The unit shall run continuously during occupied periods. The outside air damper shall initially position to its minimum position. The supply air temperature set point shall be reset from 55°F-95°F as the space temperature varies from its occupied set point of 72°F. The EMS shall modulate the heating coil valve as required to maintain the supply air temperature at set point. Upon a rise in supply air temperature above its set point, the heating valve shall modulate closed. On a continued rise in supply air temperature and if the outside air enthalpy is less than the return air enthalpy, the economizer and exhaust dampers and cooling control valve shall modulate in sequence to maintain the discharge set point. If the outside air enthalpy is greater than the return air enthalpy and chilled water is available, the dampers shall be returned to the minimum outdoor air position and the cooling coil valve shall be modulated to maintain the discharge air set point.

F. Unoccupied Mode: The unit shall be off. The outside and exhaust air dampers and cooling coil control valve shall be closed. The return air damper and heating coil valve shall be open. If the space temperature drops below the night set back set point of 62°F, the unit shall start and run on full heating until the space temperature rises 2°F above the night set back set point.

G. Above its setting, a differential pressure switch shall signal a dirty filter alarm condition to the EMS.

H. Provide a low limit thermostat serpentined across the downstream face of the unit heating coil. If the air temperature as sensed by the thermostat drops below its setpoint of 38°F, the unit fan shall be de-energized and the alarm condition indicated at the EMS. The heating and cooling coil control valves shall open.

I. Smoke detectors in the unit supply and return air streams shall signal an alarm condition to the building fire alarm system upon activation. The fire alarm system shall stop the unit. The alarm condition shall be indicated at the EMS.

J. Whenever the unit is off the outside and exhaust air dampers shall be closed. The return air damper and heating coil control valve shall be open. The cooling coil control valve shall be closed except in a low limit alarm condition as described above.

K. <u>Point List</u>

1. Space temperature
2. Supply fan VFD start/stop command
3. Supply fan status
4. Heating valve position command

5. Heating valve position feedback
6. Cooling valve position command
7. Cooling valve position feedback
8. Outside, return & exhaust dampers position command (each damper)
9. Outside, return & exhaust dampers position feedback (each damper)
10. Mixed air temperature
11. Heating coil discharge air temperature
12. Cooling coil discharge air temperature
13. Outdoor air temperature
14. Outdoor air humidity
15. Return air temperature
16. Return air humidity
17. Low limit thermostat alarm
18. Dirty filter alarm
19. Supply air smoke detector alarm
20. Return air smoke detector alarm

END OF SECTION 230993

MP:xx

SECTION 232000 – HVAC PIPING

PART 1 - GENERAL

1.01 SUBMITTALS

A. Product Data: Manufacturer's name and the schedule, type of class of all pipe and fittings.

1. Where optional materials are specified in the "Pipe and Fitting Schedule", provide a pipe schedule to indicate the options selected; including piped systems, pipe material and break down of pipe sizes.

B. Quality Control Submittals

1. Installers Qualification Data
   a. Welder Qualification Data: Copies of certification; including names and previous project experience of welders.
   b. Brazer Qualification Date for Refrigerant Piping: State refrigerant piping brazing experience; including names and list of previous project experience of brazers.

1.02 QUALITY ASSURANCE

A. Qualifications of Welding Procedures, Welders and Welding Operators: Comply with the following:

1. Section IX ASME Boiler and Pressure Vessel Code, Part QW Welding.
2. American Welding Society Standard AWS D10.9, AR-3

B. Qualifications of Brazers: Comply with the following:

1. Section IX ASME Boiler and Pressure Vessel Code, Part QB Brazing.
2. Certification of brazing operator by recognized authorities which require a qualification test.
3. Refrigerant Piping: The persons performing the brazing and their supervisors shall be personally experienced in refrigerant piping brazing procedures.

C. Codes and Standards

1. Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work and ASME Boiler and Pressure Vessel Code, Section IX, Part QW Welding or in accordance with AWS B2.1 Specifications for Welding Procedure and Performance Qualification.

2. Certify welding of piping work using Standard Procedure Specifications by, and welders tested under supervision of, National Certified Pipe Welding Bureau (NCPWB).

3. Brazing: Certify brazing procedures, brazers, and operations in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Part QB Brazing for shop

and job-site brazing of piping work or in accordance with AWS B2.2 standard for Brazing Procedure and Performance Qualification.

4. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with:
MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69 Pipe Hangers and Supports - Selection and Application
MSS SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices
Piping shall be supported at distances not exceeding the spacing specified in MC Table 305.4 or in accordance with the above MSS standards.

5. Comply with ANSI B31.1A, ASME Code for pressure Piping, and ASHRAE Equipment Guide.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Heating Hot Water Piping

Operating Pressure	125 psig
Operating Temperature	150° - 250°F
Design Code (ANSI)	B31.9

B. Chilled Water Piping

Operating Pressure	125 psig
Operating Temperature	40° - 60°F
Design code (ANSI)	B31.9

C. Condenser Water Piping

Operating Pressure	125 psig
Operating Temperature	80° - 110°F
Design Code (ANSI)	B31.9

D. Dual Temperature Water Piping

Operating Pressure	125 psig
Operating Temperature	40° - 250°F
Design Code (ANSI)	B31.9

E. Refrigerant Piping

Operating Pressure	700 psig
Operating Temperature	40° - 120°F
Design Code (ANSI)	B31.5

PART 2 – PRODUCTS

2.01 STEEL PIPE AND FITTINGS

A. Standard Weight Schedule 40 or Extra Heavy Weight Schedule 80 Pipe, black or galvanized: ASTM A 53, ASTM A 106 or ASTM A 135.

B. Flanges, Welding Neck Type, Same Pressure Rating as Adjoining Pipe: ASME B16.5.

C. Welding Fittings, Carbon Steel:

1. Butt Welding Type: ASME B16.9
   a. Allied Piping Products Co., Inc.'s Branchlets, Type 1 or 2
   b. Bonney Forge Corp's Weldolets
2. Socket Welding Type: ASME B16.11
   a. Allied Piping Products Co., Inc.'s Branchlets, Type 1 or 2
   b. Bonney Forge Corp's Threadolets or Sockolets

D. Compact Design Weld Fittings: Landish Co.'s LP, Nibco Inc's Husky, Taylor Forge Inc.'s Compact Line, Tube Turns Inc.'s Econo.

E. Malleable Iron, Steam Pattern Threaded Fittings

1. 150 lb. Class: ASME B16.3
2. 300 lb. Class: ASME B16.3

F. Cast Iron Fittings

1. Drainage Pattern, Threaded: ASME B16.12
2. Steam Pattern, Threaded: ASME B16.4
   a. Standard Weight: Class 125
   b. Extra Heavy Weight: Class 250
3. Flanged Fittings and Threaded Flanges: ASME B16.1
   a. Standard Weight: Class 125
   b. Extra Heavy Weight: Class 250

G. Unions: Rated 250 psi at 210 degrees F; ASME B16.39

H. Unions: Rated 250 psi at 275 degrees F; ASME B16.39

I. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

J. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

A. Water Tube, Types K, L, and M: ASTM B 88

B. Wrot Copper Water Tube Fittings, Solder Joint: ASME B16.22

C. Refrigerant Tube, Dry Sealed, Soft Annealed: ASTM B 280

D. Flared Tube Fittings:

1. Water Tube Type: ASME B16.26
2. Automotive Tube Type: SAE J512

3. Refrigerant Tube Type: SAE J513

E. Flanges: Conform to the Standards for fittings used in systems.

1. Brazing Flanges: ASME B16.24, hubs modified for brazing ends.

F. Unions: Cast bronze, 150 lb. Class, bronze-to-bronze seats, threaded or solder joint.

G. Cast bronze threaded fittings, Class 125 working steam pressure, conforming to ASTM B62 and ASME B16.24.

H. Hydronic press fittings (press fit - pressure-sealed joints) by Viega ProPress, Elkhart Xpress, NIBCO Press System, Grinnell G-Press (or approved equal) up to and including 4" in diameter. O-rings: EPDM; Special Tools recommended and approved by the Manufacturer. Press fittings are not acceptable for refrigerant piping.

I. Mechanically formed tee-branch outlets may be used on aboveground copper tubing. The mechanically formed outlet shall be by T-Drill Industries, Inc. or approved equal. All joints formed in this manner shall be brazed in compliance with manufacturer's recommendations. Soft soldered joints shall not be permitted.

2.03 JOINING AND SEALANT MATERIALS

A. Thread Sealant

1. Lake Chemical Co.'s, Slic-Tite.
2. Loctite Corp's pipe sealant with Teflon.

B. Solder: Solid wire type conforming to the following:

1. Lead-free tin-Silver solder (ASTM B 32 Alloy Grade Sn 96): All-State Welding Products Inc.'s 430, J. W. Harris Co. Inc's Stay-Brite or Engelhard Corp's Silvabrite.

C. Soldering Flux for Soldered Joints

1. Solder: All-State Welding Products Inc.'s Duzall; J. W. Harris Co. Inc.'s Stay-Clean; Engelhard Corp's General Purpose Liquid or Paste.

D. Brazing Alloys

1. AWS A5.8, Class BCuP-5, for brazing copper to brass, bronze, or copper; Englehard's Silvaloy 15; J. W. Harris Co.Inc.'s Stay-Silv 56; and Handy & Harman's Braze 560.
2. AWS A5.8, Class BAg-7, for brazing copper to steel or stainless steel; Englehard's Silvaloy 56-T; J. W. Harris Co.Inc.'s Safety-Silv 56; and Handy & Harman's Braze 560.

E. Brazing Flux: FS O-F-499, Type B; Handy & Harman's Handy Flux or J. W. Harris Co. Inc.'s Stay-Silv.

F. Electrodes and Welding Rods

1. Electrodes for use in Arc Welding: Heavily coated, not larger then 3/16 inch diameter exclusive of coating, unless otherwise acceptable.
2. Welding Rods: Free flowing when fused, so as to avoid excessive puddling.
3. Electrodes for Welding Stainless Steels: Coated and used with reverse polarity
4. Filler material shall conform to the appropriate AWS-ASTM specification.

G. Flange Gasket Material

1. For Use with Cold Water or Chilled Water: 1/16 inch thick rubber and chemical compatibility with the system fluid.
2. For Use with Hot Water, Air or Steam: Waterproofed non-asbestos mineral or ceramic fiber, or a combination of metal and waterproofed non-asbestos mineral or ceramic fiber, designed for the temperature and pressures of the piping systems in which installed and chemical compatibility with the system fluid.

H. Anti-Seize Lubricant: Bostick Inc.'s Never Seez or Dow Corning Corp's Molykote 1000.

2.04 GROOVED PIPING SYSTEM

A. Grooved piping system as manufactured by Victaulic Co., Grinnell by Tyco, Gruvlok by ANVIL or acceptable manufacturer.

B. Pipe:

1. Standard Weight Schedule 40 or Extra Heavy Weight Schedule 80 Pipe, black or galvanized: ASTM A 53, ASTM A 106 or ASTM A 135.
2. Use roll grooved pipe, cut grooved end piping is not acceptable.
3. Couplings: Victaulic Co.'s flexible type Style 77 and W77,-having pressure rating of:
   a. 1000 psi for 3/4 inch to 6 inch
   b. 800 psi for 8 inch to 12 inch
   c. 350 psi for 14 inch to 24 inch

C. Couplings and Fittings for Grooved End Pipe

1. Grooved-End-Tube Couplings: Rigid pattern gasketed fitting. Ductile-iron housing cast with offsetting, angle-pattern bolt pads to provide visual confirmation of joint integrity upon metal-to-metal pad contact. Tongue and recess rigid type couplings may only be used if the contractor uses a torque wrench for installation. Required torque shall be in accordance with the manufacturer's latest recommendations and each coupling shall be tagged indicating the specific value of torque attained to confirm joint rigidity and proper installation. Synthetic EPDM gasket similar to Grade EHP rated for maximum 250 deg F or Grade E EPDM rated to maximum of 230 deg F for use with housing, and steel bolts and nuts. Couplings shall be manufactured to connect copper tubing sized tube and fittings.

2. Couplings: Victaulic co.'s Zero-Flex Style 07 and 107H, having minimum pressure rating of:
   a. Style 107H or Style 07
      1) 750psi from 2 inch to 5 inch
      2) 700psi for 6 inch
      3) 600psi for 8 inch

4) 500psi for 10 inch (07 only)
5) 400psi for 12 inch (07 only)

c. Style W07: 350 psi.

1. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
   a. Steel: ASTM A53 or A106, Grade B
   b. Wrought Steel: ASTM A234, Grade WPB
   c. Ductile Iron: ASTM A536
2. Gaskets for Use with Grooved End Pipe and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.
3. Flange Adapter: Flat face, ductile iron housings with elastomeric pressure responsive gasket, for direct connection to ANSI Class 125 or 150 flanged components. Victaulic Style 741/W741.
4. Pipe Joint Make-up:
   a. Grooved Pipe Joint. Make up joint with grooved end fittings and couplings, in conformance with the manufacturer's printed installation instructions. Pipe grooving shall be rolled in accordance with joint manufacturer's specifications. Lubricate gasket exterior including lips, pipe ends and housing interiors to prevent pinching the gasket during installation. Lubricant shall be as recommended by coupling manufacturer.

2.05 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

A. Oakum: FA A-A-1186

B. Mechanical Modular Seals: Thunderline Corp's Link Seal wall and floor seals designed for the service of piping system in which installed.

2.06 DIELECTRIC CONNECTORS

A. Brass nipples, couplings, fittings, valves or combinations of are not considered a dielectric connection and shall not be an acceptable assembly for such.

B. Dielectric waterway fittings with an inert, non-corrosive thermoplastic lining (NSF/FDA listed). Manufacturer: Grinnell, GruvLok or Victaulic Co.

C. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers and dielectric gasket.

1. Rated 250 psi at 210 degrees F.
2. Rated 250 psi at 275 degrees F.

D. Flange Unions: Rated 175 psi at 210 degrees F; ASTM B16.42 (iron) and ASTM B16.24 (bronze).

2.07 PIPE SLEEVES

A. Type A: Schedule 40 steel pipe.

B. Type B: No. 16 gauge galvanized sheet steel.

C. Type C: Schedule 40 steel pipe and 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collard as required to span a minimum of one cell or corrugation, on all sided of the rough opening thru the metal deck.

D. Type D: No. 16 gauge galvanized sheet steel with 16 gauge sheet steel metal collar rigidly secured to sleeve. Size metal collard as required to span a minimum of one cell or corrugation on all sides of the rough opening thru the metal deck.

2.08 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Polished chrome plated finish, with set screw.

1. Solid Type: Models 5 and 5T by Pegasus Manufacturing Inc., Cheshire, CT; and Models 951 – 960 (inclusive) by Bridgeport Plumbing Products, Moultrie, GA.
2. Split Type: Models 3 and 3T by Pegasus Manufacturing Inc., Cheshire, CT.

B. Cast Iron: Solid type, unplated, with set screw. Model 395 by Grinnell Corp., Cranston, RI.

2.09 DRIP PANS

A. Fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up $2^1/_2$". Reinforce top, either by structural angles or by rolling top over 1/4" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

PART 3 - EXECUTION

3.01 INSTALLATION – GENERAL

A. The drawings show the general arrangement of pipe equipment but do not show all required fittings and offsets that may be required. Provide all necessary fittings, offsets and pipe runs based on field measurements.

B. Provide dielectric connections whenever connecting dissimilar materials

C. Install vertical piping plumb and piping generally parallel to walls and column center lines, unless shown otherwise on the drawings. Space piping, including insulation, to provide one inch minimum clearance between adjacent piping or other surface. Unless shown otherwise, slope steam, condensate and drain piping down in the direction of flow not less than 25 mm (one inch) in 12 m (40 feet). Provide eccentric reducers to keep bottom of sloped piping flat.

D. Install piping clear of door swings and above sash heads.

E. Make allowances for expansion and contraction.

F. Use fittings for offsets and direction changes, except for Type K soft temper water tube.

G. Cut pipe and tubing ends square: ream before joining.

H. Threading: Use American Standard taper pipe thread dies.

1. Thread brass pipe with special brass threading dies.

I. Make final connections to equipment with unions, flanges, or mechanical type joint couplings.

J. Provide taps and install wells in piping for EMS/control system sensors and flow measurement devices.

K. Install pipes in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B31 Code for Pressure Piping.

L. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations. Run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation. All piping in finished and occupied spaces shall be concealed from view by locating piping in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated on the Drawings.

M. Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures. Install drip pan under piping that must be run above electrical equipment. Do not run piping in stairwells or elevator equipment rooms except for systems serving those spaces.

N. In the outlet from each cooling coil condensate drain pan, provide a tee with a brass plug at one end to facilitate cleaning of drain. Additionally, provide a single "P" trap for proper operation of the unit.

O. Riser Casings: Unless otherwise indicated on the drawings, all exposed risers, including the drop risers, shall be enclosed in casings extending from floor to a height of 7'-6" above floor. Riser casings shall be installed after the pipe insulation work is completed, inspected and approved. Casings shall be made of 24-gage galvanized sheet steel, with the upper end wired with 1/8" half hard wire. Each casing shall be fastened to the wall at the upper end with a metal band and round head screws. Seams shall be located at the rear of the casing.

P. Casing for pipe at or near floors: Where pipes at or near floors are indicated on the Drawings to be encased, pipes shall be supported, insulated, and then enclosed in a casing of No. 20-gage galvanized sheet steel.

Q. Protection of Refrigerant Piping Located Inside Buildings: Refrigerant piping and fittings installed at a height less than 7’-3” above the floor shall be concealed or otherwise protected from mechanical damage except at the point of connection to terminal equipment.

R. Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7'-3" above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any elevator, dumbwaiter or other shaft containing a moving object or in any shaft that has openings to means of egress. Refrigerant piping shall not be installed in an enclosed public stairway, stair landing or an exit.

S. Refrigerant piping shall not be installed in public corridors unless it complies with all of the following conditions:

1. The refrigeration system to which the piping is associated utilizes a Group A-1 refrigerant and contains not more than 10 pounds of refrigerant per system, and there is not more than one system's refrigerant piping per tenant per public corridor; and

2. A complete discharge of any one refrigerant system's charge into the volume of the public corridor would be insufficient to achieve 50% of the allowable refrigerant RCL set forth in ASHRAE Standard 34; and

3. Refrigerant piping and fittings within a public corridor are installed with brazed joints or the refrigerant equipment manufacturer provided pre-charged tubing systems installed in accordance with the refrigerant equipment manufacturers instructions. Refrigerant piping and fittings shall be concealed or otherwise protected from mechanical damage.

T. Refrigerant piping shall not penetrate floors, ceilings or roofs except the following:

1. Penetrations connecting the basement and the first floor

2. Penetrations connecting the top floor and a machinery penthouse or roof installation

3. Penetrations connecting adjacent floors served by the refrigeration system.

4. Penetrations by piping in a direct system where the refrigerant quantity does not exceed the RCL set forth in ASHRAE Standard 34 for the smallest occupied space through which the piping passes.

5. Penetrations by piping enclosed by gas-tight, fire resistive duct or shaft as shown on the Drawings.

U. For steel piping runouts not detailed on the Drawings, use three elbow connections between runouts and mains.

V. Connections to Equipment: provide three elbow runouts to all rotating equipment such as pumps and chillers. Provide swing connections for boilers. Provide two elbow connections to fuel oil tanks.

W. Connections to Building Structure: connect to trusses and joints at panel points. Provide supplementary steel framing at panel points to transfer loads to framing.

X. Connection to domestic water system shall be protected by reduced pressure principal backflow preventer.

Y. Condensate drain piping from cooling coil drain pans shall be pitched at not less than one-eighth unit vertical in 12 units horizontal (1-percent slope) in the direction of discharge.

3.02 WATER AND GLYCOL PIPING SYSTEMS

A. Pitch

1. Pitch horizontal piping 1/8 inch per 10 ft. in direction indicated on drawings. When direction of flow is not indicated, pitch supply piping up in direction of flow and return piping downward indirection of flow.
2. Pitch single pipe systems up in direction of flow 1/8 inch per 10 ft.

B. Air Vents: Install air vents at locations indicated on the drawings and at each high point in system. Use manually operated air vents, unless otherwise indicated.

C. Drains

1. Install piping to be completely drainable. Provide drains at low points, consisting of a 1/2 inch Drain Valve (Apollo #78-200) and at the following locations and equipment:
   a. In each section of piping separated by valves.
   b. For each riser, where riser or runout to riser has a valve installed.
   c. For each heating cooling unit, having valves in supply and return connections.
   d. In low point of piping to each down fed convector or radiator.

D. Runouts: Connect runouts to upfeed risers to top of mains and runouts to downfeed riser to bottom of mains.

3.03 PIPE JOINT MAKE-UP

A. Threaded: Threads shall conform to ASME B1.20, joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads on steel pipe with joint compound, or red lead point for corrosion protection.

B. Soldered: Thoroughly clean tube end and inside of fitting with sandpaper or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to soldering temperature, and join the metals with type solder specified. Remove residue.

C. Flange:

1. Install threaded companion flanges on steel pipe; flanges on galvanized pipe are not required to be galvanized.
2. Provide a gasket for each joint.
   a. Hot Water Pipe Gasket: Coat with a thin film of oil before making up joint.
   b. Compressed, Control, and Instrument Air Pipe Gasket: Coat with a thin film of oil before making up joint.
3. Coat bolt threads and nuts with anti-seize lubricant before making up joint

D. Welded: Beveling, spacing and other details shall conform to ASME B31.9. See

Welder's qualification requirements under "Quality Control Submittals" in Section 1.03, Submittals.

E. Welded: Beveling, spacing and other details shall conform to ASME B31.1. See Welder's qualification requirements under "Quality Control Submittals" in Section 1.03, Submittals.

F. Compact design weld fittings up to and including 12 inch in size may be used in low pressure steam and heating hot water piping systems.

G. Brazed Joint: Thoroughly clean tube end and inside of fitting with sandpaper or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to brazing temperature, and join the metals with brazing alloy. Remove residue.

H. The use of mechanical formed outlets on copper tubing instead of soldered joints is acceptable. The maximum diameter of branches shall be $2^{1}/_{8}$". Use appropriate tool designed for mechanical formed outlets on copper tubes. All mechanical formed tee fittings shall be brazed in accordance with the Copper Development Associations Copper Tube Handbook Using BCuP series filler metal. All mechanical formed branch collars shall be listed by UPC, and Underwriters Laboratory. They shall comply with ASME Code for pressure piping ANSI B31.5c.

I. Press-Fit (Pressure Seal) Fittings: Connections shall be made in accordance with the manufacturer's installation instructions. Copper tubing shall be cut at right angles using displacement type cutter or fine-toothed saw. Burrs shall be removed from inside and outside of tubing to prevent cutting sealing element. Mark insertion depth according to manufacturer's insertion depth chart. Seals and grip ring shall be checked for correct fit. Only the manufacturer's sealing elements shall be used. Press fitting shall be slid onto tubing while turning slightly to the marked depth. Oils or lubricants shall not be used. Fitting connections shall be made with the tool provided by manufacturer. The manufacturer's assembly tool shall be used to perform the pressing process. For locations where there is insufficient access to accommodate the pressing tool, this type of joint is not allowed. Sufficient clearance must be left around each joint to allow room for the pressing tool and jaw to be attached without interference when repairing the system in the future.

J. Dissimilar Pipe Joints

1. Joining Dissimilar Threaded Piping: Make up connection with a threaded coupling or with companion flanges.
2. Joining Dissimilar Non-threaded Piping: Make up connection with adapters recommended by the manufacturers of the piping to be joined.
3. Joining Steel pipe, Brass or Copper Tubing: Make up joint with a dielectric connector.

3.04 PIPING PENETRATIONS

A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall, floor, or roof construction.

CONSTRUCTION	SLEEVE TYPE
1. Frame construction	None Required

2.	Foundation walls	A*
3.	Non-waterproof interior walls	B*
4.	Non-waterproof interior floors on metal decks	D*
5.	Non-waterproof interior floors not on metal decks	B*
6.	Floors not on grade having a floor drain	A*
7.	Floors over mechanical equipment, steam service, machine and boiler rooms.	A
8.	Floors finished or to be finished with latex composition or terrazzo, and on metal decks.	D*
9.	Floors finished or to be finished with latex composition or terrazzo and not on metal decks.	A
10.	Earth supported concrete floors	None Required
11.	Exterior concrete slabs on grade	A
12.	Fixtures with floor outlet waste piping	None Required
13.	Metal roof decks	C
14.	Mon-metal roof decks	A
15.	Waterproof floor on metal decks	D
16.	Waterproof floors not on metal decks	A
17.	Waterproof walls	A

* - core drilling is permissible in lieu of sleeves where marked with asterisks.

B. Diameter of Sleeves and Core Drilled Holes

1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
2. Size holes thru exterior masonry walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:
   b. Un-insulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.
   c. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.
   d. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.

C. Length of Sleeves (except as shown otherwise on Drawings)

1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.
2. Floors, Finished: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:
   a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.
3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.
4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.

D. Packing of Sleeves and Core Drilled Holes

1. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of

flame, smoke, fumes, and hot gasses as detailed in the UL Fire Resistance Directory, Warnock Hersey Certification Listings Book, or the Omega Point Laboratories Listings Directory. Where applicable design is not detailed in the Directories use forming materials and fill, void or cavity material to form appropriate through-penetration firestop in accordance with printed details and installation instructions from the Company producing the acceptable forming materials and fill, void or cavity materials.

2. Firestop through-penetration of floors, walls, partitions, ceilings, and roof in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the Construction Work Drawings.
3. Pack sleeves in exterior masonry walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with one-part, non-sag polysulfide base sealant: Pecora's Synthacalk GC-9, Products Research and Chemicals PRC Rubber Calk 7000, or Sonneborn's One Part Polysulfide Sealant. Optional use of Mechanical Modular Seals is recommended.

E. Weld metal collars of sleeves to the upper surface of the metal deck. Seal voids under the metal collar as recommended by the manufacturer of the metal deck.

3.05 FLOOR, WALL AND CEILING PLATES

A. Install plates for exposed un-insulated piping passing thru floors, walls, and exterior concrete slabs as follows:

1. In Finished Spaces
   a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
   b. Piping over 4 Inch Size: Split, chrome plated cast brass.
2. Unfinished Spaces (including exterior concrete slabs): Solid, unplated cast iron.
3. Fasten plates with set screws.
4. Plates are not required in pipe shafts or furred spaces.

3.06 DRIP PANS

A. Provide drip pans under piping passing over or within 3 feet of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to side of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to the drain connection and run to a conspicuous location 6" above the floor, the nearest plumbing drain, or elsewhere as indicated on drawings.

3.07 CLEANING, FLUSHING, AND INSPECTING

A. Clean exterior surfaces of superfluous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items. Inspect pressure piping in accordance with procedures of ASME B31.

B. Upon completion of the installation, remove all protecting materials, all scale and grease and leave in a clean condition for painting.

C. Hanger Adjustments: adjust hangers so as to distribute loads equally on attachments.

D. Support Adjustment: provide grout under supports so as to bring piping and equipment to proper level and elevation.

3.08 PIPING AND FITTING SCHEDULE

A. Abbreviations: The following abbreviations are applicable to the Pipe and Fitting Schedule.

BS – black steel
CI – cast iron
GE – grooved end
GMI – galvanized malleable iron
GS – galvanized steel
MI – malleable iron
SE – screwed end
ST – steel
SW – standard weight
WE – weld weight
XH – extra heavy weight

B. Where options are given, choose only one option for each piping service. Deviations from selected option will be allowed if reviewed with Engineer prior to installation.

C. Schedule of Pipe and Fittings for the different piping services is as follows:

1. Chilled Water (CWS & CWR) 125 psig and less:
   a. 3 inch and less: SW BS pipe with SE & SW CI fittings, or Type L hard temper copper tubing with wrot copper solder fittings or press-fittings.
   b. 4 inch and up: SW BS pipe, with SE & SW CI fittings, or WE & SW ST fittings, or GE & GE fittings.
2. Hot Water Supply and Return (HWS & HWR) 125 psig and less:
   a. 3 inch and less: SW BS pipe with SE & SW CI fittings, or Type L hard temper copper tubing with wrot copper solder fittings and solder or press fittings.
   b. 4 inch size: SW BS pipe, with SE & SW CI fittings, or WE & SW ST fittings, or GE & GE fittings.
   c. 5 inch and up: SW BS pipe, with WE & SW ST fittings or GE & GE fittings.
3. Refrigerants (RS, RL, HG & RD) 500 psig and less: Refrigerant lines shall be ACR tube per ASTM B280. Joints in refrigerant piping shall be brazed. Flared compression fittings may be used only at the terminal equipment connections for A1 refrigerants only. Soldered joints and mechanical press fittings for refrigerant lines are not permitted.
4. Condensate Drain Piping: Type M hard temper copper tubing with wrot copper solder fittings, and solder or type L hard temper copper tubing with press fittings.

END OF SECTION 232000

SECTION 232001 - STRAINERS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each type strainer.

PART 2 - PRODUCTS

2.01 STRAINERS

A. Body:

1. Type: Y-type

2. Material: ASTM A 126 Grade B cast iron, or ASTM A 216 WCB cast steel. ASTM B 62 cast bronze may be used in systems operating at a maximum of 125 psig steam or 175 psig water.

B. Pressure Ratings: 125 psig WSP, 175 psig OWG, when installed in systems operating at pressures up to 125 psig steam or 175 psig water, and 250 psig WSP and 400 psig OWG when installed in systems operating at pressures over 125 psig steam or 175 psig water.

C. End Connections: Screwed ends for use in threaded piping 3 inches in size and smaller; flanged ends in piping 4 inches and larger; and solder ends or screwed ends with solder adapters in Types K, L and M copper tubing.

D. Screens: Fabricate from 18-8 stainless steel or monel metal. For use in steam piping through 6 inch pipe size, 1/32 inch perforations and over 6 inch size, 3/64 inch perforations. For use in closed water and condensate return piping, 1/16 inch perforations through 3 inch size, and 1/8 inch perforations over 3 inch size. In open systems such as cooling tower piping systems, 1/8 inch perforations. Minimum free screen area, double the internal cross sectional area of the inlet pipe. Rigidly reinforce strainer screens, in sizes 14 inches and larger, with stainless steel channels and cross braces.

E. Caps and Covers: Faced and gasketed screen retaining cap, or a straight thread bushing with a blow-out proof gasket, or an internally milled tapered gasketed bushing, for strainers 3 inches in size and smaller. Strainers 4 inch in size and larger shall have a bolted gasketed screen cover. Provide graphited non-asbestos mineral or ceramic fiber gaskets.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide strainers in steam piping 2 inches in size and larger with a blow-off valve full size of blow-off outlet. In water piping 1-1/2 inch and larger, provide a drain valve with hose bibb connection. Install a short nipple and pipe cap in the blow-off outlets of

strainers not specified to have a blow-off valve or drain valve.

B. Install strainers indicated or specified to be installed in the suction or discharge piping connections to pumps in the horizontal piping run as close to pump as possible.

C. Provide strainers in piping immediately upstream of the following equipment and elsewhere as indicated:
1. Pumps.
2. Steam traps serving main steam drips.
3. Temperature control valves.
4. Pressure reducing valves.
5. Temperature and pressure regulating valves.

END OF SECTION 232001

SECTION 232003

THERMOMETERS AND GAUGES

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for each item specified.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Where Federal, NSF, ASME or other standards are indicated or required, products shall meet or exceed the standards established for material, quality, manufacture and performance.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES

A. Dresser Instruments.

B. Marsh Bellofram.

C. Moeller Instrument Co.

D. Taylor Precision Products.

E. H.O. Trerice Co.

F. Weksler Instruments Corp.

2.02 THERMOMETERS

A. General Design Features:
   1. Scale Ranges: 1-1/2 times actual working temperature required for the particular application, as approved.
      a. Maximum of two degrees between graduations and ten degrees between numerals.
      b. When scale ranges are in excess of 100 degrees, maximum range between numerals may be 20 degrees, or as otherwise approved for the particular application.
   2. Direct Reading Thermometers: Bimetallic actuated, dial type, straight pattern, angle pattern, or adjustable angle pattern as required.
   3. Remote Reading Thermometers: Vapor tension actuated, or gas actuated type, with extension capillary tube of length as required for the particular application.
      a. Case type as required for the particular mounting application.
   4. Thermometers for Sensing Liquid Temperature: Furnish with separable sockets.

a. Sockets for Use in Insulated Piping, Insulated Tanks or Similar Equipment: Extension lagging neck type, of length as required to compensate for insulation thickness, and proper immersion.

2.03 THERMOMETERS FOR MEASURING LIQUID TEMPERATURE

A. Bimetallic Actuated Thermometers: Comply with ASME B40.3, Accuracy Grade A.
1. Construction: Type 304 stainless steel, all welded construction, with clear acrylic plastic or shatterproof glass crystal.
2. Dial: White enamel background with bold black figures and graduations.
3. Head Size:
   a. Installation in Piping: 3inch diameter.
   b. Installation in Tanks and Similar Equipment: 5 inch diameter.
3. Stem: Length as required for proper immersion, and to compensate for insulation thickness, with threaded connection for socket.
4. External Calibration Device.
5. Separable Socket:
   a. Water Service: Brass or bronze.
   b. Steam Service: Stainless steel.

B. Vapor Tension or Gas Actuated Capillary Thermometers: Adjustable type, with micrometer type pointer or external calibration device, of design and materials as follows:
1. Case and Ring: Stainless steel or non-ferrous material as approved, with clear acrylic or shatterproof glass lens. Provide case of type as required for the particular mounting application. Case adjustable, allowing rotation of 360°, and stem adjustment of at least 180°. Provide set screw for locking case in desired position.
2. Movement: Brass with bronze bearings.
3. Dial: White enamel background, with bold black graduations, numerals and pointer; 3-1/2 inch diameter.
4. Capillary: Stainless steel.
5. Bulb: Copper with union well connection.
6. Separable Socket:
   a. Water Service: Brass or bronze.
   b. Steam Service: Stainless steel.

2.04 THERMOMETERS FOR MEASURING AIR TEMPERATURE

A. Bimetallic Actuated Thermometers: Comply with ASME B40.3, Accuracy Grade A.
1. Construction: Type 304 stainless steel, all welded construction, with clear acrylic plastic or shatterproof glass crystal.
2. Dial: White enamel background with bold black figures and graduations.
3. Head Size: 5 inch diameter.
4. Stem: Length as required for average duct cross sectional sensing of air temperature, and to compensate for insulation thickness.
5. External calibration device.

B. Vapor Tension or Gas Actuated Capillary Thermometers: Adjustable 3-1/2inch dial type, with micrometer type pointer or external calibration device, of design and materials as follows:
1. Case and Ring: Stainless steel or non-ferrous material as approved, with clear acrylic or shatterproof glass lens. Case adjustable allowing rotation

of 360°, and stem adjustment of at least 180°. Provide set screw for locking case in desired position.
2. Movement: Brass with bronze bearings.
3. Dial: White enamel background, with bold black graduations, numerals and pointer; 3-1/2 inch diameter.
4. Capillary: Stainless steel.
5. Bulb: Copper air sensing bulb with split flange mounting device.

2.05 PRESSURE AND COMPOUND GAUGES

A. Type: Adjustable dial type with micrometer type pointer, or external calibration device, bronze bourdon tube, and bronze bushed rotary movement.

B. Dial: White enameled background, and bold black graduations, numerals and pointer; 3-1/2 inch diameter.
1. Scale Range:
a. Standard Gauges: Double normal operating pressure.
b. Compound Gauges: From 30" Hg vacuum to double normal operating pressure.

C. Case: Cast aluminum, brass, or black finished phenolic.

D. Accuracy: Guaranteed of within 1 percent in middle third of dial range.

2.06 PRESSURE SNUBBERS AND IMPULSE DAMPERS

A. Pressure Snubbers: H.O. Trerice Co. Model 872.
B. Impulse Dampers: H.O. Trerice Co. Model 870.

PART 3 EXECUTION

3.01 INSTALLATION

A. Thermometers:
1. Install in accordance with the manufacturer's printed installation instructions.
2. Install direct reading thermometers, when the application requires installation 6 feet or less above the floor or bottom of space in which installed, and remote reading type when the installation is over 6 feet.

B. Pressure and Vacuum Gauges:
1. Install in accordance with the manufacturer's printed installation instructions.
2. For Measuring Steam Pressure: Install gauges complete with needle valves, drain cocks and syphons.
3. For Measuring Liquid Pressure: Install gauges complete with stop cocks and drain cocks.

C. Pressure Snubbers and Impulse Dampers:
1. Install pressure snubbers in the piping connections to gauges installed in suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors under 10 HP.

2. Install impulse dampers in the piping connections to gauges installed in suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors 10 HP and over.

END OF SECTION

SECTION 232006 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified.

B. Contract Closeout Submittals:

1. Operation and Maintenance Data: Submit 2 copies to the Engineer incorporated within maintenance manuals, covering the installed products.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTUERS

Taco
Bell & Gossett
Aurora Pumps

2.02 EXPANSION TANKS

A. Type B Expansion Tank: Pre-pressurized, welded steel (ASME Boiler and Pressure Vessel Code Section VIII, Division I) with heavy duty butyl rubber bladder or diaphragm, air charging valve, and drain valve.

1. Maximum Working Pressure: 125 psig.
2. Maximum Operating Temperature: 240 degrees F.

2.03 COMBINATION AIR SEPARATOR AND SYSTEM STRAINER

A. Type: Welded steel (ASME Boiler and Pressure Vessel Code Section VIII, Division I) with the following features:

1. Internal stainless steel strainer with 3/16 inch perforations and free area greater than 5 times the cross sectional area of the connecting pipe.
2. Bolted and gasketed removable cover plate.
3. Blowdown connection with ball valve.

B. Maximum Working Pressure: 125 psig.

C. Maximum Operating Temperature: 375 degrees F.

2.04 CHEMICAL BY-PASS FEEDER

A. By-Pass Feeder/Filter: Combined chemical addition and filtering, capacity of two gallons, complete with an opening in the top to facilitate charging with chemical, and a screen to properly distribute flow through feeder. Constructed of carbon steel, floor support legs, ¼ turn positive seal quick release cap, for a working pressure of 200 psi,

provide 12 filter changes (min. 20 micron). Approved Manufacturers: JL Wingert Co, Neptune Chemical or Cannon.

2.05 CENTRIFUGAL SEPARATOR

A. Separator: Constructed of carbon steel with no moving parts or filter media, 125 psi maximum pressure rating, and capable of removing solids 74 microns/200 mesh in size and larger; Lakos Separators, Fresno, CA.

1. Automatic Purge Controller: Solid state single channel controller mounted in weather resistant metal enclosure with hasp style closure, and adjustable purging duration from 8 seconds to 30 minutes.
2. Motorized Ball Valve: Lakos Series LR-MBV.

2.06 COALESCING AIR AND SEDIMENT SEPARATOR

A. The separator shall be designed, constructed, and stamped in accordance with Section VIII, Division I of the ASME Boiler and Pressure Vessel Code, and registered with the National Board of Boiler and Pressure Vessel Inspectors.

B. The separator shall be rated for 150 psi maximum working pressure and a maximum temperature rating of 450°F.

C. The body shall be made of carbon steel, shall be at least two times the nominal inlet/outlet pipe diameter, and should include two equal chambers above and below the inlet/outlet nozzles.

D. The internal coalescing medium shall consist of corrugated stainless steel sheets with 3/16" perforations and 58% open area. The coalescing medium shall be made of 304 stainless steel. The coalescing medium shall be removable to facilitate routine cleaning.

E. The separator should be capable of removing 100% of free and entrained air and 99% or more of total suspended particulate.
Provide a threaded blow down connection to allow for sediment to be regularly cleaned out of the unit, a threaded air removal connection on top of the unit so an air vent or expansion/compression tank can be connected, allowing collected air to be removed from the unit, and a threaded skim valve connection on the side of the unit to allow floating sediment to be removed.

F. Provide flanged or grooved end connections. Flange end connections should be designed according to ANSI Standards.

G. Provide a magnetic insert for removal of iron oxide and other magnetic sediment. The magnetic insert shall be made of Neodymium 45H and should have a gauss strength of at least 13,550.

2.07 AIR CONTROL FITTINGS

A. Top Outlet Boiler Fittings: Cast iron body and copper dip tube.

1. Maximum Working Pressure: 175 psig.
2. Maximum Operating Temperature: 250 degrees F.

B. Side Outlet Boiler Fittings: Cast iron body and internal dip tube.

1. Maximum Working Pressure: 125 psig.
2. Maximum Operating Temperature: 275 degrees F

C. In-Line Fittings: Cast iron body.

1. Maximum Working Pressure: 125 psig.
2. Maximum Operating Temperature: 275 degrees F.

D. Insertion Type Tank Fitting (Expansion Tanks Less Than 100 Gallons): Cast iron body with copper dip tube and water relief tube.

1. Maximum Working Pressure: 125 psig.
2. Maximum Operating Temperature: 240 degrees F.

E. In-Line Type Tank Fitting (Expansion Tanks 100 Gallons and Larger): Cast iron body with bolted and gasketed cast iron cover, internal copper U tube, stainless steel ball check, and separate dip type air vent fitting.

1. Maximum Working Pressure: 125 psig.
2. Maximum Operating Temperature: 240 degrees F.

2.08 AIR VENTS

A. Type A: Manual Coin Operated Vent; ITT Bell and Gossett Model 4V.

1. Construction: Brass.
2. Maximum Working Pressure: 150 psig.
3. Maximum Operating Temperature: 212 degrees F.

B. Type B: Automatic Float Operated Vent; ITT Hoffman Model 78.

1. Construction: Brass body with stainless steel ball check, and 1/8 inch safety drain connection.
2. Maximum Working Pressure: 150 psig.
3. Maximum Operating Temperature: 250 degrees F.

C. Type C: Automatic High Capacity Float Operated Vent; Sarco Model 13W, or ITT Bell and Gossett Model 107.

1. Construction: Cast iron body with bolted and gasketed cover, and stainless steel float mechanism, and 3/8 inch drain connection.
2. Maximum Working Pressure: 150 psig.
3. Maximum Operating Temperature: 250 degrees F.

D. Type D: Automatic High Pressure Float Operated Vent; ITT Hoffman Model 792.

1. Construction: Cast iron body (30,000 psi tensile strength) with heat treated stainless steel internal parts, and stainless steel float.
2. Maximum Working Pressure: 250 psig.
3. Maximum Operating Temperature: 300 degrees F.

4. Maximum Hydrostatic Pressure: 350 psig.

2.09 CONVECTOR HOT WATER CONTROL VALVES

A. Provide Tour & Anderson, Honeywell-Braukmann or acceptable equal convector hot water control valve with the following features:

1. The valve body shall be nickel-plated brass construction with a maximum rating of 150 psi. The valve shall have an internally threaded inlet and an outlet with a union and threaded end connection.
2. The valve shall be provided with a fully in placeable packing gland, which can be replaced without shutting down system operation.
3. The valve disc shall be constructed of EPDM capable of withstanding 250°F.
4. The valve operator shall be of the bellows design with either liquid or vapor charge. The operator shall be capable of temperature adjustment between 45°F and 86°F.
5. Provide a tamper-proof dial/operator and remote sensor consisting of an armored capillary tube sensor guard and tamper dial faceplate.

2.10 PUMP SUCTION DIFFUSERS

A. Construct unit with angle pattern cast-iron body, threaded for 2" and smaller, flanged for 2-1/2" and larger, pressure rated for 175 psi. Provide inlet vanes with length 2-1/2 times pump suction diameter or greater. Provide cylinder strainer with 3/16" diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head. Provide disposable fine mesh strainer to fit over cylinder strainer. Provide permanent magnet located in flow stream, removable for cleaning. Provide adjustable foot support designed to carry weight of suction piping. Provide blowdown tapping in bottom, gage tapping in side.

2.11 PUMP DISCHARGE VALVES

A. Provide pump discharge valves as indicated. Provide non-slam check valve with spring-loaded disc and calibrated adjustment feature permitting regulation of pump discharge flow and shutoff. Design valves to permit repacking under full line pressure, and with bolt-on bonnet. Provide flanged cast-iron valve body, pressure rated for 175 psi, maximum operating temperature of 300°F (149°C). Provide straight or angle pattern as indicated.

2.12 TRIPLE DUTY VALVE

A. The valve shall be either straight or angle pattern, non-adjustable design.
B. The valve shall be a globe valve design with a spring-loaded check valve design to prevent gravity circulation and backflow and a calibrated nameplate with multi-turn stem.
C. The valve shall include a rubber memory button to allow the valve to be re-balanced to its original position after shut-off or maintenance.
D. The valve shall have a fully back-seating disc to allow the valve packing to be replaced while under pressure.
E. The valve body shall be made of either cast iron or ductile iron, the disc shall be made of brass with an EPDM rubber seat, and the stem and valve spring shall be made of stainless steel.

F. The valve shall be available with either flanged end connections or grooved end connections. Flange end connections should be designed according to ANSI Class 150 Standards.

G. Valve models with flange x flange end connections shall be rated for 175 psi maximum working pressure. Models with groove x groove end connections should be rated for 300 psi working pressure.

H. The valve shall have a maximum temperature rating of 250°F.

2.13 LIQUID FLOW SWITCHES

A. Provide liquid flow switches as indicated to sense flow and non-flow. Construct of brass for all wetted parts, provide packless construction. Provide paddle with removable segments for pipe size and flow velocity. Provide vapor-proof electrical compartment for switches mounted on cold hydronic piping systems. Furnish switches for 115 volt, 60 cycle, single phase with 7.4 amp. rating; or otherwise as indicated.

2.14 PRESSURE REDUCING VALVES

A. Provide pressure reducing valves as indicated to maintain operating pressure on the system. Brass construction, low inlet pressure check valve, inlet strainer removable without system shut-down, non-corrosive valve seat and stem, factory set at operating pressure.

Manufacturers: Bell & Gossett Model B7-12 (adjustable range 10-25 psig), or Bell & Gossett Model #7 (adjustable range 25-60 psig) or acceptable equal.

2.15 COMBINATION BALANCING VALVE AND FLOW METER

A. Threaded and Soldered End Ball Style Types (3 inch size and Less):
   1. Normal Flow (3 inch size and Less): Bell & Gossett Series CB Circuit Setter Plus.
      a. Features:
         1) Body: Bronze.
         2) Ball: Brass.
         3) Seat Rings: Glass and carbon filled TFE.
         4) Readout Valves: Capped brass type with EPT internal check valves.
         5) Stem “O” Ring: EPDM.
         6) Calibrated nameplate and memory stop indicator.
      b. Maximum Working Pressure:
         1) Threaded End: 300 psig.
         2) Solder End: 200 psig.
      c. Maximum Operating Temperature: 250 degrees F.
   2. Low Flow (1/2, and 3/4 inch sizes): Bell & Gossett Series RF Circuit Setter Plus.
      a. Features:
         1) Body: Bronze.
         2) Ball: Brass.
         3) Seat Rings: Glass and carbon filled TFE.
         4) Readout Valves: Capped brass type with EPT internal check valves.
         5) Stem “O” Ring: EPDM.
         6) Calibrated nameplate and memory stop indicator.
         7) Soldered end connections.
      b. Maximum Working Pressure: 200 psig.

c. Maximum Operating Temperature: 250 degrees F.

B. Flanged and Grooved End Ball Style Types (4 inch size and Up): Bell & Gossett Series CB Circuit Setter.
1. Features:
a. Body and Bonnet: Cast iron (flanged end type) or ductile iron (grooved end type).
b. Disc: Bronze with EPDM insert.
c. Stem: Stainless steel.
d. Packing: Replaceable, teflon-graphite (asbestos free).
e. Gasket: Synthetic fiber-nitrile binder (asbestos free).
f. Seal Ring: EPDM.
g. Bushing: Zinc plated steel.
h. Calibrated nameplate and memory stop indicator.
2. Maximum Working Pressure: 175 psig.
3. Maximum Operating Temperature: 250 degrees F.

C. Portable readout meter with hoses, shutoff valve and vent valve, and carrying case (B&G Model RO-5 or equal).

2.16 FLOW METERING FITTINGS

A. Venturi type, complete with quick disconnect valves, safety shut-off valves, with a metal identification tag chained to each fitting. Include the following stamped data on tag: Pipe size, venturi series, station identification and meter reading at design flow rate. Maximum pressure loss through metering fittings shall not exceed 10% of the created differential pressure. One piece brass, screwed ends. Manufactured by Barco; Robertson; or Victaulic.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the work of this section in accordance with the manufacturer’s written instructions.

B. Diaphragm-Type Compression Tanks: Install diaphragm-type compression tanks on floor as indicated, in accordance with manufacturer's instructions. Vent and purge air from hydronic system, charge tank with proper air charge as recommended by manufacturer.

C. Combination Air Separator and System Strainer: Install the Work of this Section in accordance with the manufacturer's printed installation instructions.

D. Air Separator: Install in-line air separators in pump suction lines. Connect inlet and outlet piping. Install piping to compression tank with 1/4" per foot (2%) upward slope towards tank. Install drain valve on units 2" and over.

E. Chemical By-Pass Feeder / Filter: Provide each hydronic system with an independent chemical by-pass/feeder system. Installed accordance with manufacturer's printed installation instructions, complete with isolation valves, unions and bottom drain (ball) valve.

F. Air Control Fittings: Install piping to compression tank with 1/4" per foot (2%) upward slope towards tank. Install drain valve on units 2" and over.

G. Manual Vent Valves: Install manual vent valves on each hydronic terminal at highest point, and on each hydronic piping drop in direction of flow for mains, branches, and runouts, and elsewhere as indicated.

H. Automatic Vent Valves: Install automatic vent valves at top of each hydronic riser and elsewhere indicated. Install shut off valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.

I. Glycol: Install glycol in accordance with manufacturer's printed installation instructions.

J. Convection Hot Water Control Valves: Install the Work of this Section in accordance with the manufacturer's printed installation instructions.

K. Pump Suction Diffusers: Install on pump suction inlet, adjust foot support to carry weight of suction piping. Install nipple and shutoff valve in blowdown connection. After cleaning and flushing hydronic piping system, but before balancing of hydronic piping system, remove disposable fine mesh strainer.

L. Pump Discharge Valves: Install in horizontal or vertical position with stem in upward position; allow clearance above stem for check mechanism removal. After hydronic system has been completed, mark calibrated name plate with stripe of yellow lacquer to permanently mark final balance position.

M. Liquid Flow Switches: Install liquid flow switches on inlet to water chiller, inlet to water condenser, and elsewhere as indicated. Install in horizontal pipe with switch mounted in tee on top of pipe with minimum of 24" of straight pipe with no fittings both upstream and downstream of switch. Remove segments of paddle to fit pipe in accordance with manufacturer's instructions. Wiring of liquid flow switches is specified in applicable Division-23 sections, and is included as work of this section.

N. Pressure Reducing Valves: Install for each hot water boiler and heat exchanger as indicated, and in accordance with manufacturer's installation instructions.

O. Install flow metering fittings in accordance with the manufacturers printed installation instructions.

END OF SECTION 232006

SECTION 23 - METAL DUCTWORK

PART 1 - GENERAL

1.01 REFERENCES

National Fire Protection Association (NFPA).
Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Current published edition.
American Conference of Governmental Industrial Hygienists (ACGIH).

1.02 SUBMITTALS

A. Fabrication Drawings: Submit 1/4" = 1'-0" (minimum) scaled reproducible drawings of metal ductwork and fittings including but not limited to: ductwork layout detailing, sizes, fabrication lengths, locations, elevations, slopes of horizontal runs. In addition, indicate wall and floor penetrations, lighting, diffuser, building walls, steel locations with elevations and reflected ceilings (ceiling type and elevations noted). Show interface and space relationships between all items located above ceiling including but not limited to ductwork and equipment. (Submission of Engineers contract document Drawings will not be acceptable).

B. Shop Drawings: Submit duct construction standards to include schedule of all ducted air systems (indicating pressure class, materials, and seal class), sheet metal type, connections, reinforcement, turning vanes, fitting types, method of support, upper hanger attachment, and duct liner specification.

1.03 QUALITY ASSURANCE

A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals, unless otherwise shown and/or as specified:

1. HVAC Duct Construction Standards – Fourth Edition 2021.

B. Conform to the applicable requirements of NFPA 90A, 90B and 96.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Steel: ASTM A653 lock forming quality - galvanizing: ASTM A924 coating designation G-90.

B. Aluminum: ASTM B-209, Alloy 3003, Temper H-14.

C. Stainless Steel: AISI Types 302, 304 and 316, as specified.

D. Carbon steel: ASTM A568.

E. PVC Coated Galvanized Steel

2.02 FABRICATION

A. Fabricate all ductwork in accordance with this specification and SMACNA.

B. Fabricate all ductwork from galvanized, stainless steel, carbon steel, aluminum and PVC coated sheet metal as indicated.

C. Round and flat oval ductwork shall be fabricated using spiral seam construction only. Snaplock seams are not allowed

D. Rectangular and Round ductwork radius of all 90º through 45º elbows shall be 1.5 times the elbow diameter, unless otherwise noted. The radius of all 15º through 30º elbows shall be 1.0 times the elbow diameter. Mitered elbows shall be provided with turning vanes. Rectangular square throat 90º without turning vanes are not allowed.

E. Dissimilar Metals: Separate dissimilar metals used for ductwork with 10 oz. canvas impregnated with zinc chromate. No separation is required between screws or rivets and the materials in which they are inserted.

F. Sheet Metal:

1. Minimum Rectangular Duct Construction to 2" W.G. unless noted otherwise on the contract drawings. For pressure class above 2” refer to SMACNA standards tables.
2. All ductwork panels 18” and greater in width/height, 20 gage or less shall be cross broken or beaded. Internally lined ductwork is exempt from this requirement.
3. Duct construction: reinforcement, gages and sealing on fittings, elbows and short lengths of ductwork shall be continuous throughout the system.

Duct Dimension longest side	*Duct Length	Minimum Duct Gage	Transverse Joint Connection / Reinforcement
Up to 16"	48”	24	S-Slip & Drives (Min. 24 ga.)(c)
17" to 28"	48”	24	Flanged (a)(c)
29" to 36"	48”	24	Flanged (a)(c)
37" to 48"	48”	22	Flanged (a)(b)(c)(e)
48" to 84”	48”	20	Flanged (a)(b)(c)(e)
84” to 96”	48”	18	Flanged (a)(b)(c)(e)
97” to 108”	48”	16	Flanged (a)(b)(d)(e)
107” & UP	Refer to SMACNA Tables for pressure class specified		

a. Flanged ductwork joint connections shall be: SMACNA T-22, T-24, T-24a, T25a, T25b or slip-on flanges. (IE: Ductmate, Ward, Nexus, TDH and TDF installed per manufacturer’s recommendations).
b. Intermediate reinforcement per SMACNA
c. Longitudinal seam to be Pittsburgh, (snaplock seams are not allowed).
d. Longitudinal seam to be welded.

e. Refer to SMACNA reinforcement tables for additional intermediate required reinforcements.

4. Round Duct Construction - Minimum duct wall thickness unreinforced 2" W.G. positive/negative pressure.

Duct Dimension	Spiral Seam
6”	28
8”	28
10”	28
12”	28
14”	28
16”	26
18”	26
19” - 26”	26
27” - 36”	24
37” - 50”	22
51” - 60”	20
61” - 84”	18

Round ductwork shall be a manufactured duct system consisting of fittings that are factory fitted with a sealing gasket and spiral duct which, when installed according to the manufacturer’s instructions, will seal the duct joints without the use of duct sealer. Round ductwork shall be fabricated using spiral seam construction. (Snaplock seams are not allowed). Acceptable Manufacturers: Lindab (SPIROsafe); Semco (Custom Air); United McGill Corporation (Uni-Gasket).

a. All fitting ends shall come factory equipped with a EPDM rubber gasket. Gasket shall be manufactured to gauge and flexibility so as to insure that system will meet all of the performance criteria. Gasket shall be classified by Underwriter’s Laboratories to conform to ASTM E84-91a and NFPA 90A flame spread and smoke developed ratings of 25/50.
b. Fitting ends shall be calibrated to dimensional tolerance standard of the associated spiral duct.
c. Fitting ends from 3” to 24” diameter shall have over edges for added strength and rigidity.
d. Elbows from 3” to 12” diameter shall be 2-piece die stamped and continuously stitch welded. All elbows 14” diameter and larger shall be standing seam gorelock construction and internally sealed.
e. The fittings shall be either spot-welded or button punched construction and shall be internally sealed. When contract documents require divided flow fittings, only full body fittings will be accepted.
f. Volume dampers as specified in 233300 - Ductwork Accessories.

5. Flat Oval Duct Construction – Minimum duct wall thickness unreinforced 2" W.G. positive/negative pressure.

Duct Width	Spiral Seam Duct Gage	Gage of Fitting
To 24"	24	20

25" to 36"	22	20
37" to 48"	22	18
49" to 60"	20	18
61" to 70"	20	16
71" to up	18	16

Flat Oval ductwork shall be fabricated using spiral seam construction. (Snaplock seams are not allowed). Acceptable Manufacturers: Lindab (SPIROsafe); Semco (Custom Air); United McGill Corporation (Uni-Gasket).

2.03 SUPPORT

A. Duct Hangers

1. Strap Hangers: As indicated below and/or same material as duct.
2. Rod Type Hangers: Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with 2 removable nuts each end for positioning and locking rod in place. Unless stainless steel, galvanized or cadmium plated; shop coat with metal primer.

Maximum Half of Duct Perimeter	Strap @ 10 ft Spacing	Rod @ 10 ft Spacing	Strap @ 8 ft Spacing	Rod @ 8 ft Spacing	Strap @ 5 ft Spacing	Rod @ 5 ft Spacing	Strap @ 4 ft Spacing	Rod @ 4 ft Spacing
P/2 = 30"	1" x 22 ga	10 ga.	1" x 22 ga.	10 ga.	1" x 22 ga.	12 ga.	1" x 22 ga.	12 ga.
P/2 = 72"	1" x 18 ga	3/8"	1" x 20 ga.	1/4"	1" x 22 ga.	1/4"	1" x 22 ga.	1/4"
P/2 = 96"	1" x 16 ga	3/8"	1" x 18 ga	3/8"	1" x 20 ga	3/8"	1" x 22 ga	1/4"
P/2 = 120"	1 ½" x 16 ga	½"	1" x 16 ga	3/8"	1" x 18 ga	3/8"	1" x 20 ga	1/4"
P/2 = 168"	1 ½" x 16 ga	½"	1 ½" x 16 ga	½"	1" x 16 ga	3/8"	1" x 18 ga.	3/8"
P/2 = 192"	-	½"	1 ½" x 16 ga	½"	1" x 16 ga	3/8"	1" x 16 ga.	3/8"

B. Cable Hanging Systems (Gripple): Cable Hanging Systems with adjustable mechanical

devices compliant with SMACNA shall consist of ready-to-use factory tested kit comprising of cable and cable end options. Crimps shall be Factory installed. All cable hanger products shall be certified as SMACNA and UL listed. All cable hangers shall have a minimum of 4:1 safety margin over the listed Safe Working Load (SWL).

C. Miscellaneous Fasteners and Upper Hanger Attachments:

1. Sheet Metal Screws, Machine Bolts and Nuts: Same material as duct, unless otherwise specified.
2. Concrete Inserts: Steel or malleable iron, galvanized; continuously slotted or individual inserts conforming with MSS SP-58, Types 18 & 19, Class A-B.
3. C Clamps: Fee & Mason Co.'s 255L with locking nut, and 255S with retaining strap.
4. Metal Deck Ceiling Bolts: B-Line Systems, Inc.'s Fig. B3019.
5. Welding Studs: Erico Fastening Systems, capacitor discharge, low carbon steel, copper flashed.
6. Structural (carbon) Steel Shapes and Steel Plates: ASTM A36, shop primed.
7. Stainless Steel Shapes and Plates: ASTM A276 and ASTM A666.
8. Machine Bolt Expansion Anchors:
   a. Non-calking single unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 1.
   b. Non-calking double unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 2.
   c. Self - drilling type: FS FF - S - 325, Group III, Types 1 and 2

2.04 SEALANTS

A. Acceptable Manufacturers: Duro Dyne Corp.; Foster Products Div., H.B. Fuller Co.; Hardcast Inc.; United Sheet Metal Div., United McGill Corp.

B. U.L. Listed adhesives (liquid or mastic), scrim, or combinations thereof, as required for pressure class; suitable for system operating temperatures; compatible with media conveyed within, insulation (if any), and ambient conditions.

C. Use of duct tape or silicone caulk for sealing seams and joints is not acceptable.

2.05 ACOUSTICAL DUCT LINING

A. Requirements of Regulatory Agencies:

1. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B and should not support microbial growth as tested in accordance with ASTM G21 and G22.
2. The duct liner shall conform with the requirements of ASTM C 1071 with NRC not less than 0.70 as tested per ASTM C423 using a Type "A" mounting, and with a thermal conductivity no higher than .25 at 75□F mean temperature.
3. Installation of duct lining shall be in accordance with the appropriate SMACNA Manual installation detail on drawing as amended by this Section.

B. Acceptable Manufacturers: Johns Manville Mechanical Insulations Linacoustic RC; or approved equal.

C. Materials

1. Duct Lining: Minimum 1½" thick fibrous glass, with the side exposed to the airstream coated with a tough, acrylic polymer to guard against incursion of dust or dirt into the substrate. The surface coating shall be specially formulated with an immobilized, EPA-registered anti-microbial agent so it will not support the growth of fungus or bacteria, as determined by test in accordance with ASTM C 1071 and ASTM G21 and G22. Edge coating shall be factory applied to assure coverage of the leading edges per SMACNA requirements. Material shall be a standard catalog item as furnished by a nationally recognized manufacturer.
2. Adhesive shall be approved by the duct liner manufacturer and shall meet ASTM C 916
3. Mechanical Fasteners: Furnish fasteners complete with weld pins and retaining clips for securing lining to ductwork. Weld pins shall not distort, mar or burn the ductwork. Acceptable Products: Graham Co. Weld Pins.
4. Sound Absorption Coefficients: Minimum acceptable coefficients as tested per ASTM C423-61 and ASTM E795

Product Thickness	Mounting Type	Octave Band (Hz)						NRC
		125	250	500	1000	2000	4000	
1½"	"A"	0.1	0.47	0.85	1.01	1.02	0.99	.85

D. Installing Duct Lining in Low Velocity Ductwork

1. Install duct lining in accordance with SMACNA "Duct Manual and Sheet Metal Construction for Ventilating and Air Conditioning Systems", except as specified otherwise herein and indicated on drawings.
2. Ductwork dimensions noted on the drawings are the inside duct dimensions after the application of lining.
3. Bond liner to ductwork with a 100% coverage of adhesive, with the factory coated liner surface facing the airstream. Start installation of fasteners within 3" of the leading edge of all transverse joints within upstream leading edge of duct lining. Refer to drawings for installation detail.
4. All exposed leading edges and transverse joints shall be neatly butted without gaps and be coated with factory-applied edge coating or field-applied factory approved edge treatment. Metal nosings shall be securely installed over transversely-oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct. In addition, coat all exposed surfaces of mechanical fasteners and sheet metal nosing with vapor barrier mastic.

2.06 SEALING REQUIREMENTS

A. Sealing Requirements

1. Construct as a minimum to the following pressure and seal class.

System	Pressure Class	Seal Class
Supply, return and outside air duct	+2"	'A'
Exhaust and relief duct	-2"	'A'
Dishwasher exhaust	-4"	(a)

Fume hood exhaust	-4”	(b)

(a) Duct shall be rectangular aluminum duct commercial grade with liquid tight welded seams.
(b) Duct shall be 20 gauge AISI Type 316 stainless steel with liquid tight welded seams.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Duct Cleanliness Construction Requirements
1. Duct fabrication, shop storage, transportation to site, site storage, and installation, shall comply with SMACNA Duct Cleanliness Level B and additional requirements as indicated.
2. Site storage area shall be clean, dry and exposure to dust minimized.
3. Before installation of individual duct sections, they are to be inspected to ensure that they are free from all debris.
4. The internal surfaces of the uninsulated ductwork shall be wiped to remove excess dust immediately prior to installation.
5. Open ends on complete ductwork and overnight work-in-progress shall be sealed.

B. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Coordinate with all trades proposed locations of ductwork prior to installation.

C. Provide necessary transformation pieces and flexible fabric connections for ductwork connected to air handling equipment or air inlet and outlet devices.

D. All transitions shall be made with less than 30□ included angle.

E. Provide safing to properly close off all openings in ductwork or sleeves in which any duct accessory is being installed as required by irregular openings or off-size equipment. All attempts shall be made to maximize the size of the accessory to the opening or duct.

F. Ductwork installations exposed to view in finished spaces (refer to project documents) shall receive special attention by contractor. Care shall be taken to provide a neat uniform look, Round duct spiral seams shall align. Ductwork will be free of foreign matter (IE: construction debris, mud, dirt, excessive duct sealer, ETC.) Do not install damaged ductwork. Remove damaged ductwork at the direction of the engineer. Ductwork indicated to be painted (refer to project documents). Duct shall be wiped clean of grease, oils and any foreign materials not conducive to the adhering of paint.

G. Coordinate the installation of all mechanical systems. Provide sufficient space around ductwork and equipment during installation to allow the proper application of insulation. As needed insulate ducts prior to erection in place when ducts are required to be installed proximate to walls, ceilings, equipment or other ductwork, which will not permit adequate space for the installation of insulation, at a later date. Exercise reasonable care in the installation of insulated ductwork, so that insulated surfaces are in perfect condition before and after installation.

H. Ductwork seen behind registers, in other words; ductwork visible through a register (inside the duct) shall be painted using one coat of flat black metal paint (after proper surface cleaning). Paint coverage shall be that no unpainted duct will be seen. This applies to all grilles, registers and diffusers.

3.02 SPECIALTY REQUIREMENTS

A. Dishwashing and other Scullery Equipment: Fabricate ductwork as follows:

1. Form double corner seams or Pittsburgh lock seams.
2. Fabricate elbows and transitions with Pittsburgh lock seams.
3. Fabricate double compounded elbows and other complex fittings with double corner seams.
4. Locate seams in horizontal ducts at top corners of ducts, unless otherwise approved in writing.
5. Locate seams in vertical ducts at rear corners of ducts.

B. Stainless Steel Duct:

1. Use stainless steel with a No. 4 finish where ductwork installed exposed in finished rooms and No. 2B finish in other locations. Use stainless steel fasteners and reinforcing members for ductwork installed exposed in finished rooms and where fasteners penetrate duct. Galvanized fasteners and reinforcing members may be used in unfinished spaces for non-penetrating service.

C. PVC Coated Duct:

1. Polyvinyl Chloride (PVC) coated ductwork shall be fabricated from galvanized steel as specified above and coated with PVC. The coating thickness shall be 4 mils on the outside, and 1 mil on the inside for buried ductwork and ductwork installed indoors. Ductwork exposed to the elements shall have an inside coating of 4 mils

3.03 SEALING SEAMS, JOINTS, AND PENETRATIONS

A. Conform to SMACNA Seal Class A as a minimum regardless of pressure class except for continuously welded or soldered seams, where called for. Helical (spiral) lock seams are exempt from sealant requirements. All other duct surface connections made on the perimeter of the duct are deemed to be joints. Use of duct tape for sealing of seams and joints is not acceptable.

B. Sealing requirements shall include, but not be limited to: transverse (girth) joints; longitudinal seams; duct wall penetrations; branch and sub-branch intersections; duct collar tap-ins; fitting subsections; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum and casing abutments to building structures.

C. Pittsburgh sealing, sealant shall be applied in the Pittsburgh pocket prior to hammering. Sealant applied to the interior (back side of seam) of duct or to the exterior of seam is unacceptable.

D. Ducts and plenums connecting to louvers (intake, exhaust, relief) shall be constructed with the bottom of duct/plenum sloped so that water drains back and out of the louver or

to a central drain connection within the plenum. If a drain connection is provided, pipe to nearest floor drain. The duct or plenum shall be sealed as directed in 3.02, A (above). In addition, all seams of lower 6" (or greater, if higher water level potential exists) shall be soldered, or otherwise gasketed and sealed to create water-tight seams, joints and penetrations.

3.04 DUCT MATERIAL INSTALLATION SCHEDULE

A. Fabricate supply, return, exhaust, and outside air ductwork from galvanized sheet metal except as described below:

B. Fabricate the following ductwork from aluminum:

1. Inlet and discharge ductwork connected to cooling towers and evaporative condensers.
2. Exhaust ductwork from dishwashers, scullery equipment hoods, showers, locker rooms and swimming pool areas.

C. Fabricate the following ductwork from stainless steel:

1. Supply, return, and re-circulated air ductwork connected to devices installed in surgical operating, surgical scrub-up, surgical recovery and surgical work rooms. Use AISI Type 302 or 304 stainless steel.
2. Exhaust ductwork connected to laboratory exhaust fume hoods. Install stainless steel from the individual hood to its respective fan and from the fan to the point of discharge to the outside air.
3. Dishwashing and other scullery equipment.

D. Fabricate the following ductwork from PVC Coated galvanized steel:

1. Exhaust ductwork connected to laboratory exhaust fume hoods. Install PVC coated steel from the individual hood to its respective fan and from the fan to the point of discharge to the outside air.
2. Ductwork installed underground.
3. Ductwork installed encased in concrete.

E. Fabricate the following ductwork from black steel or stainless steel:

1. Kitchen hood exhaust (grease) ducts.

3.05 ACOUSTICAL DUCT LINING

A. In all locations indicated on drawings.

B. Install duct lining the final ten feet from the inlet side of exhaust fans (excluding grease ducts & laboratory fume hood exhaust.)

C. Install duct lining from the horizontal ceiling heat pump discharge to the first branch runout or 15 feet.

D. Install duct lining in the return air ductwork from the horizontal ceiling heat pump to the nearest branch runout or 15 feet.

E. Install duct lining ten feet down stream of the variable air volume boxes.

3.06 HANGERS FOR DUCTS

A. Install hangers for ducts as specified in the SMACNA Manual, with the following exceptions:

1. Rectangular ducts up to 42 inches wide, not having welded or soldered seams, and supported from overhead construction; extend strap hangers down over each side of the duct and turn under bottom of duct a minimum of 2 inches. Secure hanger to duct with 3 full thread sheet metal screws, one in the bottom and 2 in the side of the duct.
2. Prime coat plain steel rods threaded at the site immediately after installation with metal primer.

3.07 UPPER HANGER ATTACHMENTS

A. General: Secure upper hanger attachments to structural steel or steel bar joists wherever possible.

1. Avoid damage to reinforcing members in concrete construction.
2. Metallic fasteners installed with electrically operated or powder driven tools may be used as upper hanger attachments, in accordance with the SMACNA Manual.

B. Prohibited Use

1. Drive-on beam clamps (caddy clamp), flat bars or bent rods, as upper hanger attachments.
2. Powder driven drive pins or expansion nails.
3. Powder driven or welded studs to structural steel less than 3/16 inch thick.
4. Loads in excess of 250 lbs from a single welded or powder driven stud.
5. Powder driven fasteners in precast concrete.
6. Do not use c-clamps to attach hangers in a shear type application. Use sheet metal screws, machine bolts and nuts or welds.

C. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by ductwork support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.

1. Secure upper hanger attachments to steel bar joists at panel points of joists.
2. Do not drill holes in main structural steel members.

D. Attachment to Concrete Filled Steel Decks:

1. Existing Construction: Install expansion shields.
2. New Construction: Install concrete inserts or metal deck ceiling bolts.
3. Do not attach hangers to decks less than 2-1/2 inches thick.

3.08 DUCT RISER SUPPORTS

A. Support vertical round ducts by means of double-ended split steel pipe riser clamps bearing on floor slabs or adjacent structural members, at every other floor through which the riser passes.

B. Unless otherwise specified or shown on the drawings, support vertical rectangular ducts by means of two steel angles, secured to duct and resting on floor slab or adjacent structural steel member, at every other floor through which the duct passes. Size supports as follows:

Max. Side Dimension (Inches)	Support Angle (Inches)	Secure to Duct with	Min. Bearing at Each End (Inches)
36	1 x 1 x c	Screws	2
48	1½ x 1½ x c	Bolts	3

3.09 OPENINGS THROUGH FIRE RATED WALLS & FLOORS NOT REQUIRING FIRE DAMPERS

A. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.

B. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame, smoke, fumes, and hot gasses as detailed in the UL Fire Resistance Directory, Warnock Hersey Certification Listings Book, or the Omega Point Laboratories Listings Directory. Where applicable design is not detailed in the Directories, use forming materials and fill, void or cavity material to form appropriate through-penetration firestop in accordance with printed details and installation instructions from the Company producing the approved forming materials and fill, void or cavity material.

C. Fill the annular space between the duct and the rated construction (both sides of the rated construction) with a non-hardening, intumescent, UL listed firestop product; and in the absence of manufacturer's firestop system installation instructions or Engineer's recommendation, attach 1½" angles around the perimeter of all ducts (both sides of the rated construction).

D. Firestop through-penetration of floors, walls, partitions, ceilings, and roofs in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the General and Mechanical Construction Drawings.

END OF SECTION 233113

SECTION 233416

CENTRIFUGAL FANS

PART 1 GENERAL

1.01 PERFORMANCE REQUIREMENTS

A. Design fans and supports to withstand all seismic loads. Refer to seismic loading criteria on the Contract Drawings.

B. Seismic Performance: Design and install fans to assure continued performance of their intended function when subjected to the specified seismic forces.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, include rated capacities of each unit, dimensional data, operating weights, accessories, material finishes and installation instructions.

B. Shop Drawings: Manufacturer's detailed dimensional drawings showing equipment, assemblies, dimensions, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

C. Quality Control Submittals:
1. Certified fan sound power ratings at operating conditions.

D. Contract Closeout Submittals:
1. Operation and Maintenance Data: Deliver 2 copies covering the installed products, to the Owner.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Each fan shall bear AMCA Seal indicating that fans comply with AMCA 211, Certified Ratings Program - Air Performance, and AMCA 311, Certified Sound Ratings Program For Air Moving Devices.
2. Operating Limits: Classify according to AMCA 99-2408.
3. Sound power level ratings shall comply with AMCA Standard 301, Method for Calculating Fan Sound Ratings from Laboratory Test Data.

1.04 REFERENCES

A. ABMA: American Bearing Manufacturer's Association (formerly AFBMA).

B. AMCA: Air Movement and Control Association.

C. ASHRAE: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver fans as factory-assembled units to the extent allowable by shipping limitations, with protective crating and coverings.

B. Disassemble and reassemble units as required for movement to the final locations in accordance with manufacturer's printed instructions.

C. Lift and support units at the manufacturer's designated lifting or supporting points.

1.06 PROJECT CONDITIONS

A. Do not operate fans until ductwork is clean, filters, if any, are in place and bearings are lubricated.

B. Field Measurements: Verify dimensions and clearances by field measurements.

PART 2 PRODUCTS

2.01 FANS

A. Belt or direct driven centrifugal fans, factory fabricated, assembled, finished and tested; consisting of housing, wheel, fan shaft, bearings, motor drive assembly, and support structures.

B. Equip fan unit with unitary base.

2.02 HOUSINGS

A. Materials and Fabrication: Formed and reinforced steel curved scroll housing panels, spun metal inlet bell, and the doors or panels for access to internal parts and components.
   1. Bracing: Steel angle or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
   2. Scoll/Housing Drain Connection: One inch threaded steel pipe coupling welded to low point of fan scroll, with threaded steel plug and non-galling lubricant applied to threads.

B. Tubular Centrifugal Fans: Fabricate tubular housing from formed and reinforced steel panels with welded seams. Also provide the following:
   1. Outlet guide vanes.
   2. Spun inlet cone with flange.
   3. Outlet flange.
   4. Brackets suitable for horizontal or vertical mounting.
   5. Anti-swirl inlet guide vanes.

2.03 WHEELS

A. Backward Inclined Wheel: Steel or aluminum construction with curved inlet flange, back plate, backwardly inclined blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and fastened to shaft with set screws.

B. Airfoil Wheel: Steel construction with smooth curved inlet flange; heavy back plate; hollow die formed airfoil shaped blades continuously welded at the tip flange and back plate; cast iron or cast steel hub riveted to back plate and fastened to shaft with set screws.

C. Forward Curved Wheel: Baked enameled or galvanized steel construction with inlet flange, back plate, shallow blades with inlet and tip curved forward in the direction of airflow, mechanically secured to flange and back plate; cast steel hub swaged to back plate and fastened to shaft with set screws.

D. Radial Tip Wheel: Steel or aluminum construction with curved inlet flange, back plate, backwardly inclined curved blades positioned so the tip approaches a radial position and welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and fastened to shaft with set screws.

E. Radial Blade Wheel: Steel or aluminum construction cast or welded to the hub.

2.04 SHAFTS

A. Turned, ground, and polished hot-rolled steel with keyway and drive end counter sunk for tachometer readings. Ship with protective coating of lubricating oil. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower.
   1. Size shaft so that first critical speed is at least 25 percent over maximum operating speed.

2.05 BEARINGS

A. Ball, roller, or taper roller type. Select bearings in accordance with ABMA Standards for Ball and Roller Bearings.
   1. Sealed and Pre-lubricated Shaft Bearings: Self-aligning, pillow block type ball bearings. ABMA Bearing Rated Life: L-10 with minimum bearing life of 50,000 hours.
   2. Grease Lubricated Shaft Bearings: Self-aligning, pillow block type; ball, roller or tapered roller bearings with double locking collars and split two-piece, cast iron housing. ABMA Bearing Rated Life: L-10 with minimum bearing life of 50,000 hours.

2.06 BELT DRIVES

A. Service Factor:
   1. Design belt drive to operate at the horsepower equivalent to the highest bhp of the fan multiplied by service factor of 1.5.

B. Fan Pulleys: Cast iron or cast steel with interchangeable split, tapered bushing, dynamically balanced at factory prior to assembly.

C. Motor Pulleys:
   1. Motors 5 hp and Smaller: Adjustable pitch type with pitch adjustment at the middle of adjustment range at fan application design conditions.
   2. Motor 5 hp and Larger: Fixed pitch type.

D. Belts: Oil resistant, non-sparking, and non-static.
   1. Match belt lengths and manufacturer for multiple belt drives.

E. Belt Guards: Comply with OSHA and SMACNA requirements. Fabricate from flattened expanded metal 1/2 inch diamond mesh screen welded to steel angle frame, prime coated.
   1. Include provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
   2. Secure belt guard to fan or fan supports without interfering with vibration isolation.

F. Motor Mount: Adjustable for belt tensioning.

2.07 ACCESSORIES

A. Equip fan with the following accessory items:
   1. Scroll Access Doors: Shaped to conform to scroll, with quick opening, positive closing latches, and gaskets.
   2. Companion Flanges: Galvanized steel, for duct connections.
   3. Fixed Inlet Vanes: Steel with fixed cantilevered vanes welded to inlet bell.
   4. Shaft Seal: Non-gas-tight with aluminum rub ring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of fans. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install fans in accordance with manufacturer’s printed installation instructions.

B. Floor Mounted Fans: Support fans on concrete mechanical equipment pads (see Section 230549) with vibration isolation devices (see Section 230550).

C. Ceiling Suspended Fans: Suspend fans from building construction with vibration isolation devices. See Section 230550.

D. Install units with clearances for service and maintenance.
   1. Provide clearance for complete wheel, and shaft removal.

E. Provide inlet screens on fans with non-ducted fan inlets. If fan has inlet bearing, install screen on inboard side of bearing.

3.03 FIELD QUALITY CONTROL

A. Inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

B. Pre-start Up:
1. Remove shipping blocking, and bracing.
2. Verify lubrication for grease bearings and other moving parts.
3. Set dampers in connected ductwork in proper position.
4. Belt Driven Fans: Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guard.

C. Start Up:
1. Energize motor, verify proper operation of drive system, and fan wheel.
2. Belt Driven Fans:
   a. Adjust fan pulley to indicate initial rpm, further adjust pulley to obtain system design conditions if required.
   b. Replace fan and motor pulleys if required to achieve design conditions.
   c. Measure and record motor voltage and amperage.

END OF SECTION

SECTION 233417 - CEILING EXHAUST FANS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each fan.

1.02 QUALITY ASSURANCE

A. Fans shall be U.L. listed and labeled.

B. Regulatory Requirements:

1. Sound Power Level: AMCA Standard 300-67.

PART 2 - PRODUCTS

2.01 MANUFACTURERS/COMPANIES

Brod & McClung - Pace Co.
PennBarry Ventilator Co., Inc.

2.02 FAN

A. General: Fans shall be of the electric motor driven centrifugal type, installed in an insulated sheet steel unit casing with a decorative air intake grille, slow speed electric motor, electric terminal box inside housing, speed controller and outside wall cap.

B. Fan Assembly: True centrifugal wheels, mounted on the extended shaft of an electric motor. Fabricate fan scroll from heavy gage sheet steel with a corrosion resistant coating. Isolate the entire fan assembly from the unit casing with elastomer type vibration eliminators. Fan assembly shall be easily removable from the unit casing.

C. Unit Casing: Fabricate from heavy gage sheet steel, with a corrosion resistant coating. Acoustically line the interior surfaces of the casing with fibrous glass, coated on the exposed side. Provide discharge outlet complete with backdraft damper.

D. Electric Motor: Low speed (1200 RPM or below), with built-in thermal overload protection, designed to operate on 120 volt, 60 cycle, 1 phase service. Assembly shall be complete with flexible electric cord, plug and electrical receptacle inside housing. Suitably grounded fan motor.

E. Inlet Air Grille:

1. Aluminum: Etched and coated with clear acrylic lacquer.
2. Steel: Primed and finished with baked-on white enamel.
3. Plastic: White of the egg crate design.

F. Speed Control: Solid state circuitry, with polished chromium plated wall plate, suitable for use with standard electrical wall box.

G. Wall Cap: Polished aluminum, with built-in backdraft damper.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install fans and accessories in complete accordance with the manufacturer's printed installation instructions and the requirements of the Contract Documents.

END OF SECTION 233417

SECTION 233713 – DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Metal Ductwork: Section 233113

1.03 REFERENCES

NFPA: National Fire Protection Association.
SMACNA: Sheet Metal and Air Conditioning (Sub)Contractors National Association, Inc.
UL: Underwriters Laboratories, Inc.

1.04 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, diagrams, standard schematic drawings, and installation instructions for each manufactured product. Submit SMACNA Figure Numbers for each shop fabricated item.

B. Provide a room schedule, to include: listing of all rooms (room name or number), equipment identification tag, CFM, face and inlet neck size, quantity required and corresponding manufacturers' model number.

C. Samples: When requested by the Engineer, submit one complete unit for each type of proposed air inlet and outlet device. Approved samples will be delivered to the job site for installation.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Unless otherwise shown or specified, comply with the applicable requirements of the following:
   a. SMACNA: Gages of materials, fabrication, sealing, and installation shall be in accordance with the HVAC Duct Construction Standards Manual.
   b. NFPA: Standards No.'s 90A, 90B, 91, 96, and 101.
   c. UL: Standards No. UL555.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Nailor Industries, Inc.
Carnes

Metalaire
Titus
Tuttle

2.02 GRILLES AND REGISTERS

A. Fabricate grille and register faces, and frames installed in shower rooms, locker rooms, toilet rooms, can washing, dishwasher, food serving, and kitchens of aluminum with an etched and acrylic coated finish.

B. Unless otherwise specified, fabricate all other grille and register faces, and frames of steel with factory applied finish as follows:

1. Prime coat for installation in walls and gypsum board, hard plaster or acoustic plaster ceilings specified to be painted.
2. Baked-on white enamel for installation in splined acoustic ceilings, metal pan ceilings and suspended lay-in tile ceilings.

C. Provide frames for each grille and register except as follows:

1. Grilles and registers installed directly in exposed uninsulated ductwork.
2. Grilles or registers designed for installation in suspended lay-in tile ceilings or suspended combination lay-in and splined tile grid ceilings.
3. Grilles or registers installed in gypsum board walls or ceilings.
4. Grilles or registers installed in metal pan ceilings.

D. Exhaust or Return Grilles: Fixed 40 degree or 45 degree single deflection type, consisting of a heavy formed face with face bars on nominal 0.66 inch or 0.75 inch centers, installed in a No. 20 gage frame of same material as bars.

1. Sidewall grilles shall have horizontal face bars.
2. Manufacturers:
   a. Carnes Model #RSLAH (Steel), #RALAH (Aluminum);
   b. Anemostat Model #S3HD (Steel), #X35VD (Aluminum);
   c. Titus Model #350 RL (Steel), #350FL (Aluminum);
   d. Tuttle & Bailey #T70D (Steel), #A70D (Aluminum).

E. Supply Registers:

1. Face: Adjustable double deflection type, consisting of a heavy formed face, with rear bars or vanes installed in a No. 20 gage frame, of same material as bars or vanes, with face and rear bars or vanes on nominal 0.66 inch or 0.75 inch centers; individually adjustable and front pivoting to any desired setting, by means of a key. Furnish one adjustment key per every 5 registers.
2. Damper Assembly: Opposed multi-blade type, consisting of frame, blades, and key operated movement of the locking type, with operator projecting through frame. Furnish operators which are removable or permanently secured in place, as directed. Fabricate damper assemblies for use with aluminum or stainless steel register faces of aluminum with an etched or acrylic coated finish, and for use with factory painted register faces, or equivalent finish as approved by the Engineer.
3. Manufacturers:
   a. Carnes Model #RTDAV (Steel), #RNDAV (Aluminum);

b. Anemostat Model #S2VO (Steel), #X2VO (Aluminum);
c. Titus Model #300RS5 (Steel), #300FS5 (Aluminum);
d. Tuttle Model #T647 (Steel), #A647 (Aluminum).

F. Exhaust or Return Registers:

1. Face: Fixed 40 degree or 45 degree fixed single deflection type, consisting of a heavy formed face with face bars on nominal 0.66 inch or 0.75 inch centers, installed in a No. 20 gage frame, of same material as bars.
   a. Sidewall registers shall have horizontal face bars.
2. Damper Assembly: Opposed multi-blade type, consisting of frame, blades and key operated movement of the locking type, with operator projecting through frame. Furnish operators which are removable or permanently secured in place, as directed. Fabricate damper assemblies for use with aluminum or stainless steel register faces of aluminum with an etched or acrylic coated finish, and for use with factory painted register faces, or equivalent finish acceptable to the Engineer.
3. Acceptable Manufacturers:
   a. Carnes Model #RTLAH (Steel), #RNLAH (Aluminum);
   b. Anemostat Model #S35HOD (Steel), #X35VOD (Aluminum);
   c. Titus Model #350RL5 (Steel), #350FL5 (Aluminum);
   d. Tuttle Model #T77D (Steel), #A77D (Aluminum).

G. Linear Return Register:

1. Extruded aluminum linear grille, 3" wide with c" blades on ¼" centers in extruded aluminum frame with 1" flange. Grille shall be designed for installation in a sidewall application with spring-clip retainers. Blades shall be designed for 0□ deflection. Finish to be brushed aluminum.
2. Damper Assembly: Opposed multi-blade type, consisting of frame, blades and key operated movement of the locking type, with operator projecting through frame. Furnish operators which are removable or permanently secured in place, as directed. Fabricate damper assemblies for use with aluminum or stainless steel register faces of aluminum with an etched or acrylic coated finish, and for use with factory painted register faces, or equivalent finish as approved by the Engineer.
3. Manufacturer: Carnes Model #CTQBD.

H. Frames for Registers and Grilles:

1. Fabricated from a minimum of No. 20 USS gage stamped or rolled steel, or extruded aluminum, to match material and finish of mating grille or register face. Exposed joints shall be welded and ground flush, or corner joints completely closed with neatly welded backtrim. Furnish frames complete with felt or sponge rubber gaskets on all four sides, except when frames are used as plaster stops.

2.03 AIR DIFFUSERS

A. Square, rectangular or linear type as indicated. Do not use neck or duct connection sizes indicated to size diffusers.

B. Furnish aluminum diffusers with an etched and clear acrylic coated finish where installed in shower, toilet rooms, locker rooms, dishwasher, food serving and kitchens.

C. In general, fabricate diffusers of steel with a white baked enamel finish, or aluminum with an etched and clear acrylic coated finish, unless otherwise specified. Roll or round and reinforce all exposed edges of diffusers and provide readily removable internal diffuser parts to permit cleaning and access to ducts. Design removable parts and assemblies so that they cannot be reassembled in a manner which would produce an incorrect air distribution pattern. Secure internal assemblies with fasteners, which will allow their removal without use of special tools.

D. Circular, Square and Rectangular Diffusers: Complete with volume control damper (and adjustable equalizing grid), fabricated of same material as diffuser. Damper shall be adjustable by means of operator handle and rod device, which is designed to be locked in any position. Diffusers installed in plaster ceilings shall have plaster grounds and anti-smudge rings of same material and finish as diffuser, or diffuser shall have specially designed outer rings or rims with contours of sufficient depth below ceiling line to minimize smudging.

1. Surface Mounted Diffuser: Manufacturers
   a. Carnes Model #SKFA w/KXKA (Steel), #SAFA w/KXUA (Aluminum);
   b. Anemostat Model #SDF w/DOB (Steel), #D w/DOB (Aluminum);
   c. Titus Model #TIC-1 w/AG-95 (Steel), TIC-AA-1 w/AG-95 (Aluminum);
   d. Tuttle Model #ME W/OBD (Steel), #AME W/A7.
2. Stamped for T-Bar Diffuser: Manufacturers
   a. Carnes Model #SFTB w/KXMB (Steel), #SFAB (Aluminum);
   b. Anemostat Model #EPL w/LD (Steel), #EPL (Aluminum);
   c. Titus Model #TMS-3 w/AG-75 (Steel), #TMS-AA (Aluminum);
   d. Tuttle Model #1400 W/T4 (Steel), #A1400 (Aluminum).

E. Linear Diffusers: Complete with air flow and pattern control valve, adjustable to any desired setting, fabricated of same material and with same finish as diffuser.

1. Manufacturers: Aluminum Construction Standard
   a. Carnes Model #CH
   b. Anemostat Model #SLAD
   c. Titus Model #ML
   d. Tuttle Model Imperialine 6000/7000

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Unless otherwise shown or specified, install the Work of this section in accordance with the manufacturer's printed installation instructions and the SMACNA Manual.

B. Ductwork seen behind registers, in other words; ductwork visible through a register (inside the duct) shall be painted using one coat of flat black metal paint (after proper surface cleaning). Paint coverage shall be that no unpainted duct will be seen. This applies to all grilles, registers and diffusers.

END OF SECTION 233713

SECTION 233730 - LOUVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Metal Ductwork: Section 233113
Direct Digital Control System: Section 230923

1.03 SUBMITTALS

A. Shop Drawings: Show fabrication details of Louvers.

B. Product Data: Manufacturer's catalog sheets, performance charts, test data, specifications and installation instructions for each.

1.04 GENERAL

A. AMCA Test Standard: For louvers with specified air performance, water penetration, and air leakage ratings, provide units whose ratings have been determined in compliance with AMCA Standard 511.

B. Structural Performance: Design, engineer, fabricate and install units capable of withstanding the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of components, metal fatigue or noise from louver blade rattle or flutter and permanent damage to fasteners or anchors.

1. Wind Load: Uniform pressure of 30 lbf per sq. ft. acting inward and outward.
2. Normal thermal movement from ambient temperature change (range) of 100□ F (55.5□ C) and its effect on metal surfaces due to both solar heat gain and night time sky heat loss.

C. Field Measurements: Verify size, location and placement of louver units prior to fabrication.

D. Preassemble units in shop to greatest extent possible.

PART 2 - PRODUCTS

2.01 LOUVERS

A. American Warming and Ventilating, LE-23; or acceptable equal.

B. Kynar Finish: Color selection by Architect. Colors to be selected from Manufacturer's full range of color selections.

C. Materials:

1. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5 or T52, 0.081" minimum section.
2. Fasteners: Noncorrosive and compatible with materials joined. For aluminum, use aluminum or 300 series stainless-steel fasteners.

D. Fabrication, General: Fabricate louvers and accessories to comply with requirements indicated for design (blade angle, blade profile, blade spacing), metal type and form, sizes, depth, arrangement and metal thicknesses indicated or required for performance and use intended.

1. Fabricate frames, including sills, to suit adjacent construction, with mullions at spacing indicated but no further apart than recommended by manufacturer.
2. Join frame members to one another and to blades with fillet welds, concealed from view; or mechanical fasteners; or both, as standard with louver manufacturer.

E. Horizontal drainable fixed blade louvers with gutters in front edges of blades and channels in jambs and mullions for drainage, complying with the following requirements.

1. Performance rated as follows for 48 inch square unit and marked with the AMCA Certified Ratings Seal:
   a. Louver Free Area: Not less than 8.9 sq. ft.
   b. Static Pressure Loss: Not more than 0.13 inch water gage at an airflow at 1009 fpm free area velocity.
   c. Water Penetration: 0.01 oz. per sq. ft. of free area at an airflow of 1009 fpm free area when tested for 15 minutes.

F. Louver Screens: On interior face of exterior louvers, provide louver screens complying with the following requirements:

1. Frames: Of same metal and finish as louvers to which frames are attached, and of the rewireable type with driven spline or insert for securing screen mesh.
2. Louver Screening for Aluminum Louvers: 1/2" square mesh bird screening, 0.063 inch diameter aluminum wire.

PART 3 - EXECUTION

3.01 EXECUTION

A. Deliver louvers to Construction (Sub)Contractor for installation.

END OF SECTION 233730

SECTION 234100 - AIR FILTERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Metal Ductwork: Section 233113

1.03 REFERENCES

NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
UL 900 - Test Performance of Air Filter Units.
ASHRAE 52-76 - Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter.

1.04 SUBMITTALS

A. Product Data: Catalog sheets and specifications for each type filter.

B. Quality Control Submittals:

1. Test Reports: Filters shall be tested by an independent testing laboratory in accordance with ASHRAE 52-76. Submit test reports with identifying test number, and certified by an official of the testing laboratory.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Supply air filters that are UL listed, Class 2.

1.06 MAINTENANCE

A. Extra Materials: One spare set of air filters for each air handling unit utilizing air filters. Deliver spare filters to the Owner's Representative in the manufacturer's original boxes, labeled as to filter usage.

PART 2 - PRODUCTS

2.01 AIR FILTER TYPES

A. Rigid Air Filters: Extended surface, deep pleated type with average efficiencies based on ASHRAE 52-76; Airguard Vari-Pak (12 inch thick), American Air Filter (12 inch thick), or Precisionaire Rigi Pleat (12 inch thick). Refer to filter schedule on drawings for size and capacity.

1. Assembly: Filter pack constructed of high density microfine glass fibers laminated to synthetic backing material, and bonded to corrosion resistant welded wire support grid. Pleat configuration maintained by pleat spacers installed on

both air entering and air exiting sides. Filter pack enclosed and continuously sealed to galvanized steel enclosing frame, and supported by diagonal members bonded to both air entering and air exiting sides.

2.02 SIDE LOADING FILTER HOUSINGS (FS-1 & FS-2)

A. Factory packaged flanged housing designed for insertion into ductwork or connection to air handling units. Housing constructed of minimum 0.09 inch thick aluminum members with screw joints or 16 gage galvanized steel with welded joints, and reinforced and braced for rigidity.

B. Filter Loading: Primary filters and prefilters inserted into preformed tracks, and capable of servicing thru access doors with positive locking devices located on either end of housing.

C. Permanent Airseal: Consists of woven pile gasketing on top and bottom of filter tracks, continuous neoprene gasketing around access doors, and foam gasketing along edges of filter cartridges.

2.03 SIDE LOADING FILTER HOUSING

A. General: Provide a complete factory assembled and packaged unit, with flanged ends, designed for insertion in a duct system or connection to an air handling unit. provide housing of physical size and number of filter units as indicated on drawings.

B. Fabrication: Fabricate housing from No. 16 gauge corrosion resistant sheet steel, properly braced and reinforced with corrosion resistant steel members, so as to form a rigid unitized assembly. Provide housing complete with through slide channels for loading or unloading filters from either side of the housing. Provide integral prefilter tracks to accommodate disposable or cleanable prefilters. Provide continuously gasketed access doors. Doors will utilize perimeter gasketing of closed-cell neoprene rubber. Latches will be quick acting, spring loaded and non-corrosive material. Each filter will be sealed against its respective gasket surface. The entire periphery of the filter face will make contact with a gasket surface. Hollow-coil extruded closed-cell ¾" wide rubber gaskets will seal the filters; sealing pressure will be supplied through a toggle and cam locking mechanism.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install high efficiency filter bank assemblies in ductwork or housing chambers all as indicated on the drawings.

END OF SECTION 234100

SECTION 237223 – PACKAGED ROOFTOP DOAS UNIT with ENERGY RECOVERY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Vibration Isolation: Section 230550
Division 26 Specifications

1.3 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each type of unit specified.

B. Contract Closeout Submittals:

1. Operation and Maintenance Data: Submit 2 copies to the Engineer, incorporated within maintenance manuals, covering the installed products.

1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Fan ratings shall be approved by the AMCA. In lieu of an AMCA approved fan rating for the fan section of the unit, the Engineer may accept the fan manufacturer's certified rating, provided this fan manufacturer has AMCA approved ratings on his regularly manufactured centrifugal fans.

B. Source Quality Control: Factory test units in accordance with AMCA Standard 210 "Test Code for Air Moving Devices" and ARI Standard 410 "Standard for Forced Circulation Air Cooling and Air Heating Coils".

1.5 WARRANTY

A. Provide parts and labor warranty extending either 12-months from date of unit start-up or a maximum of 18-months from unit ship date.
B. Provide twenty-five year heat exchanger limited warranty from unit ship date.
C. Provide five year compressor warranty for all units.

1.6 MAINTENANCE

A. Extra Materials: Provide one complete spare set of air filters with each unit, in addition to the installed operating set. Suitably box and label spare filters.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Trane Horizon Model OAU.

2.2 MATERIALS

A. Sheet Metal:

1. Galvanized Sheet Steel: Zinc coated carbon steel, commercial quality-ASTM A527-67, mill phosphatized. Galvanizing: ASTM A525-67, commercial coating class 1.25 oz. per sq. ft.
2. Cold Rolled Steel: Carbon steel, commercial quality-ASTM A366-66T. Sheet steel shall be de-greased, cleaned and phosphatized in the factory of the manufacturer, or mill phosphatized.

2.3 AIR HANDLING UNITS

A. GENERAL UNIT DESCRIPTION

1. Unit(s) furnished and installed shall be packaged outdoor air unit(s) as scheduled on contract documents and described in these specifications. Unit(s) shall be designed for dehumidification, cooling and/or heating of 100% Outdoor Air. For dehumidification and cooling modes the evaporator temperature shall be monitored, reported at unit controller. Compressor controls shall modulate capacity to maintain evaporator leaving set point. Hot Gas Bypass shall not be used to control compressor capacity. Compressor Hot Gas Reheat (HGRH) shall be factory installed. To prevent rehydration of evaporator condensate the reheat coil face shall be located a minimum of 6" downstream from the leaving face of the evaporator coil. Heating system shall include modulating controls. Compressor on-off only or primary heating on-off only controls shall not be acceptable control strategies.
2. Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
3. Unit discharge airflow configuration shall be, vertical discharge thru unit base.

B. CABINET

1. Cabinet panels: 2" double-wall foamed panel construction throughout the indoor section of unit to provide nonporous, cleanable interior surfaces. All interior seams exposed to airflow shall be sealed.
2. Insulation: 2" polyisocyanurate foam metal encapsulated with no exposed edges. Initial R value of 6.6 per inch of thickness.
3. Cabinet base shall be double wall construction designed to prevent trapping or ponding of water within the unit base. Cabinet base pan shall be insulated with 2" thick polyisocyanurate foam. Foam insulation shall be fully enclosed with galvanized steel insulation cover. Insulation shall not be applied to underside of unit base.
4. Cabinet Base Rails: Side and end base rails shall include openings for forklift and tie-down access. To protect unit base from fork damage side rails shall include removable heavy gauge fork pockets.
5. Shipping anchors attach to and/or through unit base rails. Straps over unit shall not be used to secure unit for shipping.
6. Cabinet material interior and base rails: shall be G-90 zinc-coated galvanized steel. Material gauge shall be a minimum of 14-gauge for base rails, 16-gauge for structural members and 20-gauge for access doors and cabinet panels.

7. Exterior Corrosion Protection: Exterior cabinet panels shall be a base coat of G-90 galvanized steel with both exterior and interior surfaces cleaned, phosphatized and finished with a weather-resistant baked enamel finish. Unit's surface shall be in compliance with ASTM B45 salt spray testing at a minimum of 672 hour duration.
8. Cabinet construction shall provide hinged panels providing easy access for all parts requiring routine service.
9. Cabinet top cover shall be one piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.
10. Hinged Access Panels: Water- and air-tight hinged access panels shall provide access to all areas requiring routine service including air filters, heating section, electrical and control cabinet sections, optional ERV and power exhaust fan section, supply air fan section, evaporator and reheat coil sections. Insulated doors shall be constructed to allow the hinges to be reversed in the field.
    a. Hold-open devices shall be factory installed on all hinged access doors. Chains shall not be used as hold-open devices.
    b. Latches with locking hasp or tool operated closure devices shall be factory installed on all hinged access panels.
11. Drain Pan material shall be Type 430 Stainless steel drain and constructed to be sloped in two directions to ensure positive drainage with corners exposed to standing water and drain fittings welded liquid tight to prevent leaks. Pan shall have a minimum depth of 2". Base of drain pan shall be insulated with 1" thick foam insulation.
12. Provide openings either on side of unit or thru the base for power, control and gas connections.
13. Cabinet shall include optional interior liner constructed of Type 304 stainless steel with sealed seams.
14. Unit shall be equipped with a 6" filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the following section.

C. FANS AND MOTORS

1. Indoor fans shall be high efficiency backward curved impeller.
2. The indoor fan motor shall be an electronic commutated motor with integrated power electronics for variable motor speed.
3. Outdoor fans shall be direct drive with premium efficiency motors, statically and dynamically balanced, draw through in the vertical discharge position.
4. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

D. AIR FILTERS

1. Evaporator Inlet shall include a full compliment of pleated media air filters. Filters shall be:
    a. 2" deep MERV 13

E. DAMPERS

1. Unit shall include a motor operated outdoor air damper constructed of galvanized steel.
2. Damper blades shall be air foil design with rubber edge seals designed not to exceed a 4 CFM/SQ FT leakage rate exceeding ASHRAE 90.1 damper leakage requirements.
3. Damper actuator shall be factory mounted and wired sealed spring return and either two-position or fully modulating.
4. Dampers air velocity shall not exceed 2000 fpm.

5. Return Air damper shall be of same material, construction and leakage rate as outdoor air damper. Return air damper actuator shall be factory mounted and wired sealed spring fully modulating and operate based on outdoor air damper feedback signal to properly regulate RA airflow.

F. DEHUMIDIFICATION/COOLING

1. Compressors
   a. Digital Scroll Compressor
      i. Circuit One
   b. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage.
   c. Internal overloads shall be provided with the scroll compressors.
   d. Each compressor shall have a crankcase heater to minimize the amount of liquid refrigerant present in the oil sump during off cycles.
   e. Each compressor shall be mounted on rubber vibration isolators, to reduce the transmission of noise.
   f. Provide each unit with one hermetically sealed refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, liquid line charging port, suction and liquid line pressure ports, sight glass, and thermal expansion valve.
   g. Provide each circuit with automatic reset high and low pressure and high temperature switches for safety control.

2. Coils
   a. Evaporator, Condenser and Hot Gas Reheat coils shall be constructed with copper tubes mechanically bonded to configured aluminum plate fins.
   b. Coils shall be factory leak tested in accordance ANSI/ASHRAE 15-1992 at a minimum pressure of 500 PSIG.
   c. The condenser coil shall have a fin designed for ease of cleaning.
   d. Evaporator coil shall include four or six rows of cooling interlaced for superior sensible and latent cooling with a maximum of 12 FPI for ease of cleaning.
   e. Reheat coil shall be fully integrated into the supply airstream and be capable of delivering design supply air temperature.
   f. To prevent re-hydration of condensate from evaporator coil, the evaporator coil face and the hot gas reheat coil face shall be separated by a minimum of six inches.
   g. Condenser coil hail guards shall be factory installed.

3. Condenser Section

   a. Outdoor Fans: Shall be direct drive vertical discharge design with low-noise corrosion resistant glass reinforced polypropylene props, powder coated wire discharge guards and electro-plated motor mounting brackets.
   b. Fans shall be statically and dynamically balanced.

G. HEATING

1. Hot Water (Glycol) Coil

   a. Completely assembled and factory installed heating system shall be located in the primary heating position located downstream of the indoor fan assembly and be integral to unit and approved for use downstream from refrigerant cooling coils in units mounted outdoors. Threaded gas connection shall terminate at manual shut-off valve. Provide capability for sidewall or thru-base gas piping.

H. ELECTRICAL RATINGS AND CONNECTIONS

1. All high voltage power components such as fuses, switches and contactors shall include a service personnel protection barrier or shall be a listed as touch-safe design.
2. Field wiring access to be provided thru unit base into isolated enclosure with removable cover.
3. Power wiring to be single point connection.
4. Wiring internal to the unit shall be colored and numbered for identification.
5. Unit shall be factory wired to field wiring terminal block mounted in isolated enclosure.
6. Factory wired main power disconnect and overcurrent device shall be rated for total unit connected power
7. Unit SCCR rating shall be a minimum of 5kA
8. Factory wired Voltage/Phase monitor shall be included as standard. In the event of any of the following, the units will be shut down and a fault code will be stored in the monitor for the most recent 25 faults. Upon correction of the fault condition the unit will reset and restart automatically.
    a. Phase Unbalance Protection: Factory set 2%
    b. Over/Under/Brown Out Voltage Protection: +/-10% of nameplate voltage
    c. Phase Loss/Reversal
9. Factory to mount and wire optional120 volt convenience outlet. Field wiring of convenience outlet not acceptable.
10. All low voltage field wiring connections shall be made at factory installed low voltage terminal strip.

I. UNIT CONTROLS

1. Main Unit Controller (MCM) shall be a microprocessor based controller with resident control logic. Controller program logic shall include
    a. Include single program with field selectable
        i. Discharge Air control with unit conditioning modes enabled based on outdoor air conditions and controlled to maintain discharge air setpoints.
        ii. Space control with unit conditioning modes enabled and controlled to maintain space setpoints.

2. MCM shall:
   a. Prevent simultaneous operation of any conditioning modes.
   b. Accept separate setpoints for Occupied and Unoccupied states.
   c. Call for Dehumidification based on dew point setpoints. When no call for Dehumidification is present MCM shall control calls for Cooling, Heating and Economizer modes based on sensible or enthalpy temperature setpoints. MCM shall have onboard clock and scheduling function for occupancy.
   d. Include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
   e. Enable HGRH dehumidification and cooling modes and control modulation to maintain (discharge air temperature / space temperature).
   f. Unit shall include minimum discharge air control.
3. MCM Touch Screen shall include full color display and shall be (factory installed in unit control compartment / field mounted remote from unit and field wired up to a maximum of 300 ft.) and provide a full list of points included in the MCM. The display shall provide a list and history of all unit alarms.
4. System Sensors shall include: Factory installed and wired Outdoor Air Temperature, Outdoor Air Humidity and Evaporator Leaving Air Temperature and factory furnished, field installed Discharge Air Temperature.
   a. ERV Option includes exhaust air leaving temperature sensor
5. System controls shall include:
   a. Anti-cycle timing.
   b. Minimum compressor run/off-times.

J. POWER EXHAUST – BAROMETRIC RELIEF

1. Provide a factory installed power exhaust assembly that shall be designed to ventilate return air to atmosphere.
2. Plenum mounted direct drive airfoil design exhaust wheel material shall be heavy gauge aluminum, welded construction and rated for up to Class III speed/pressure performance. Belt-drive and/or forward curve plenums fans shall not be used.
3. Exhaust to discharge through Barometric relief dampers with counterbalance weight located on each side of unit cabinet.

K. OUTDOOR AIR SECTION ENERGY RECOVERY (ERV)

1. The rotating wheel heat exchanger is composed of a rotating cylinder in an insulated cassette frame complete with removable energy transfer media, seals, drive motor and drive belt. Energy transfer media shall be constructed of a durable synthetic lightweight polymer. The total energy recovery wheel is coated with a desiccant that shall be either Type-A silica gel or 3A molecular sieve and permanently bonded to the energy transfer media without the use of binders or adhesives. The lightweight polymer substrate will not degrade nor require additional coatings for application in marine or coastal environments. Coated segments are cleanable outside of the cabinet with detergent or alkaline coil cleaner and water. Desiccant will not dissolve nor deliquesce in the presence of water or high humidity.
2. Sensible and latent recovery efficiencies must be clearly documented through a testing program conducted in accordance with ASHRAE Standard 84 and AHRI 1060. The testing must have been conducted by a qualified independent organization. The performance test reports must be provided for engineering review as part of the submittals for this project.
3. The rotor design shall ensure laminar airflow to minimize parasitic pressure loss and to optimize the operating efficiency of the system fans. The pressure loss across the media shall be no greater than the scheduled pressure loss values. The energy wheel shall operate effectively up to 180 degrees F.
4. The rotor media shall be permanent, with an anticipated life of 20 years. It must be tested in accordance with ASTM Standard E-84 and provide smoke and flame spread ratings of less than 25 and 50 as required by NFPA 90A and UL 1995. A copy of the ASTM E-84 test report confirming the method of test and results shall be provided with the submittal. Heat recovery wheels incorporating “throw-away” media and tested to UL900 for Class 2 filters are not acceptable.
5. The wheel manufacturer must have been producing energy recovery wheels for a minimum of ten years.
6. The rotor shall be supplied with perimeter brush seals and face contact seals to minimize air leakage and wheel bypass.
7. The rotor media shall be supported by a structural aluminum hub and aluminum reinforcing spoke system. The rotor bearings must be greaseable and provide L10 life in excess of 20 years.

8. The cassette framework shall be made of galvanized steel to prevent corrosion.
9. The rotor must be driven by long-life polyurethane/polyester composite link belt system. The rotor/cassette shall be designed so that belt can be removed or serviced without the removal of the bearing. A 3 phase A/C gear motor shall be utilized to accommodate variable speed applications.

2.4 ROOF CURB

A. Contractor shall provide factory 14" high tall roof curb, 18 gauge perimeter made of zinc coated steel with supply and return air gasketing and wood nailer strips. Ship knocked down and provided with instructions for easy assembly.

B. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units of type as indicated, in complete accordance with the manufacturer's instructions and as indicated.

B. Support: Install units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.2 MANUFACTURERS FIELD SERVICES

A. Unit start-up and commissioning shall be completed by a Factory-trained and factory-certified technician.
   1. Manufacturer must have twenty factory-authorized and factory-trained technicians within a 50 mile radius of job site.

B. The contractor shall furnish manufacturer complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

END OF SECTION 237223

SECTION 237313 - AIR HANDLING UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Vibration Isolation: Section 230550
Wiring of Mechanical Equipment: Section 230512
Motor Controls: Section 230512

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each type of unit specified.

B. Contract Closeout Submittals:

1. Operation and Maintenance Data: Submit 2 copies to the Engineer, incorporated within maintenance manuals, covering the installed products.

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Fan ratings shall be approved by the AMCA. In lieu of an AMCA approved fan rating for the fan section of the unit, the Engineer may accept the fan manufacturer's certified rating, provided this fan manufacturer has AMCA approved ratings on his regularly manufactured centrifugal fans.

B. Source Quality Control: Factory test units in accordance with AMCA Standard 210 "Test Code for Air Moving Devices" and ARI Standard 410 "Standard for Forced Circulation Air Cooling and Air Heating Coils".

1.05 MAINTENANCE

A. Extra Materials: Provide one complete spare set of air filters with each unit, in addition to the installed operating set. Suitably box and label spare filters.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Trane Co.
McQuay
Carrier
AAON

2.02 MATERIALS

A. Sheet Metal:

1. Galvanized Sheet Steel: Zinc coated carbon steel, commercial quality-ASTM A527-67, mill phosphatized. Galvanizing: ASTM A525-67, commercial coating class 1.25 oz. per sq. ft.
2. Cold Rolled Steel: Carbon steel, commercial quality-ASTM A366-66T. Sheet steel shall be de-greased, cleaned and phosphatized in the factory of the manufacturer, or mill phosphatized.

2.03 AIR HANDLING UNITS

A. General Design: Provide units of sectional construction each consisting of a fan section, coil section, multizone damper section, filter section, filter/mixing box section and accessories, as indicated.

B. Casing: Fabricate exterior wall panels from a minimum of No. 18 USS gage sheet steel with interior wall panels of minimum 20 gage sheet steel, properly reinforced and braced for maximum rigidity, with supporting steel framework as required. Closed cell foam gasketing shall be used where modules join. Furnish easily removable panels and inspection doors for access to all internal parts. Fabricate inspection doors from minimum No. 18 USS gage sheet steel, with the edges of all doors and removable panels formed for rigidity. Thermally insulate the casing with a factory installed, minimum 1" thick fibrous glass liner between the exterior and interior wall panel. With the exception of perforated wall panels there shall be no insulation exposed to the airstream.

C. Fan Section: Furnish fans of the double width, double inlet, forward curved, multi-blade centrifugal type, designed for low operating speeds. Fabricate fan housing utilizing lock seam construction to insure rigidity and render it mechanically airtight. Provide streamlined fan inlets, with all fan outlet areas proportioned to wheel size, according to AMCA standards. Provide shaft bearings of the grease packed ball or sleeve type, sealed in self-aligning pillow blocks. Bearings shall be equipped with grease lines allowing for lubrication from one side of the fan. Factory coat fan shaft with a corrosion preventative compound. Mount unit motor internally, complete with adjustable base, adjustable V-belt drive and an approved belt guard. Fan and motor shall be internally isolated from unit casing with spring isolators, furnished and installed by the unit manufacturer. Statically and dynamically balance and test fan assembly at factory.

D. Coil Section: Support heating coils from unit casing, as required and approved. Design coils with built-in-pitch between headers, or pitch coils inside casings to permit drainage, with connections located where indicated. Provide coils with adequate gasketing or safing to prevent air by-pass between coil channels, finned surfaces and casing. Fabricate coils of seamless copper, with aluminum flat plate fins with formed collars permanently bonded to the tubes by mechanical expansion of the tubes, or equivalent method as approved. Design encased coil banks, so as to permit the removal of any individual coil, without disturbing other coils in the bank. Coil extensions shall pass through ends of casing and shall be air and water tight. Design coils for use with steam or water for a minimum working pressure of 200 psig WSP, 200 psig OWG and factory test at 200 psig air under water.

E. Refrigerant Cooling Coil Section: Support cooling coils from unit casing, as required and

approved. Provide coils with adequate gasketing or safing to prevent air by-pass between coil channels, finned surfaces and casing. Fabricate coils of seamless copper, with aluminum plate fins with formed collars permanently bonded to the tubes by mechanical expansion of the tubes, or equivalent method as approved. Design encased coil banks so as to permit the removal of any individual coil without disturbing other coils in the bank. Suction headers shall be constructed of copper tubing. Suction connections shall penetrate unit casings to permit sweat connections to refrigerate lines. The coils shall have equalizing vertical distributors sized according to the capacities of the coils. Coil performance data shall be certified in accordance with ARI Standard 410. The coils shall be proof tested to 450 psig and leak tested to 300 psig air pressure under water. After testing, the inside of the coils shall be dried, all connections shall be sealed and the coil shall be shopped with a charge of dry nitrogen. Section shall be equipped with double-wall stainless steel condensate drain pan for positive drainage. Drain connection shall be one side of unit.

F. Cartridge Filter Section: Furnish filter sections, with filters arranged with sufficient area so that the velocity through the filters does not exceed 500 fpm, unless otherwise indicated. Design of section shall allow for the easy removal and replacement of filters. Cartridge filters shall be minimum 12" deep with efficiency rating of not less than 90 percent as determined by ASHRAE Standard 52-76. Filters shall be installed in a side access housing with seals to minimize leakage. Provide 2" pre-filters.

G. Filter / Mixing Box Section: Furnish combined air filtering and mixing functions in one standard section. Filter section shall include angled 2” pleated throwaway filters rated for 30% efficiency on ASHRAE Standard 52-76. Filters shall be accessible from both sides through hinged access doors. Mixing box shall include integral, parallel blade interconnected, outdoor and return low leakage air dampers. Dampers shall be insulated with thermally broken frame and shall have stainless steel or compressible edge seals and vinyl blade edge seals for a maximum leakage rating of 4.1 cfm per sq.ft. of face area at 4” water gauge differential static pressure. Blades shall rotate on nylon bearings; Tamco Series 9000 BF or acceptable equal.

H. Multizone Damper Section: Multizone damper section is to be designed as a single assembly with airfoil type blades. Dampers shall have compressible jamb seals and extruded vinyl blade seals with leakage ratings of less than nine cfm/sq. ft. at one-inch w.g. Dampers shall rotate on stainless steel bearings. Unit shall have a hot deck, cold deck and a bypass deck with pressure equalizing baffles in the hot and bypass decks.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units of type as indicated, in complete accordance with the manufacturer's instructions and as indicated.

B. Support:

1. Support floor-mounted units as shown in detail on the drawings. Provide vibration isolators between units and supports.

APPENDIX

ADDITIONAL MULTI-ZONE SPECIFICATIONS

The zoning microprocessor controllers shall monitor zone temperature setpoints, zone temperatures, zone temperature rates of change, and actual zone damper positions. The controllers shall then position the dampers for proper airflow to maintain the current zone temperature setpoints. Airflow is controlled within software adjustable minimum and maximum damper position setpoints. System airflows will be pressure dependent. The Unit will control to a field adjustable cooling setpoint. Controllers shall have provisions for controlling supplemental or perimeter heat. The system controller shall scan all zones and thermostats to determine deviation from setpoint, time of deviation, and the number of zones requiring a temperature adjustment. Based on this information, the zone control dampers will be opened or closed and the zoned heat will be enabled or disabled (if installed). The system controller shall also monitor discharge air pressure and control a variable frequency drive to maintain appropriate system pressures.

Dampers

The zone dampers shall be extruded aluminum airfoil construction with blade edge and jam seals and the bypass damper (if used) will include steel construction with interlocking frame design and blade seals.

Base Cabinet

The zoning section is constructed of 16 gauge galvanized steel and 1.5" square tubing and is painted with standard Trane slate gray paint.

Actuators

Actuators controlling the zone dampers will be Belimo DDC actuators with a floating point input.

Lifting Lugs

Lifting lugs will be provided on the zoning base. The lifting lugs are designed and built to lift the whole unit as one piece.

Base Insulation

The zoning section has double wall positively latching doors and is insulated with 1.5" foil face insulation.
All seams are sealed with foil tape.

Zone Sensors

Wall mounted thermostat with external adjustable set point, night setback, communication jack, and on/cancel buttons. One sensor supplied for each zone.

Power Wiring

Power will need to be run to the disconnect switch located in the unit's power panel. This unit is single point power.

Hot Water Zone Heat

Each zone will include a hot water reheat coil. Reheat coils will include a galvanized sheet metal frame, aluminum fins and copper tubes. Each zone will also include a factory provided three ways, modulating control valve, shut-off valves, and a circuit setter. The circuit setters can be used to balance the water flow going to each reheat coil. Each coil will be piped to a common header, which will be connected to factory piping package. The factory piping system will include a system pump, air separator, expansion tank, shut-off valves, a fill line, and the steam heat exchanger.

ADAPTOR CURB SPECIFICATIONS

Pre-fabricated rooftop adapters to be manufactured of prime galvanized steel construction, 18 or 14 gauge or as required, meeting ASTM A653/653M with welded corners and with seams joined by continuous water and air tight welds. Adapters shall be insulated and internally reinforced with internally supports, and include necessary block off panel to allow use of existing ductwork.

Installer to field verify all existing roof units to insure proper fit between existing roof top equipment base to new rooftop unit, unless the awarded adapter curb manufacturer representative performs the field survey.

- Heavy gauge Prime G-90 galvanized steel 18 to 14 gauge meeting ASTM A653/653M
- Fully welded and mitered corners
- 1 1/2" thick 3-pound density rigid insulation
- Integral counter flashing for weather tightness
- Adapters are internally supported with cross channel supports on center
- Wood nailer optional if additional roofing is required

END OF SECTION 237313

SECTION 237314

VARIABLE FREQUENCY DRIVES

I. GENERAL

A. This specification covers all variable frequency drives (VFDs) designated on the drawing schedules. All standard and optional features detailed herein shall be included within the VFD panel.

The VFD shall be factory installed by the HVAC original equipment manufacturer. The VFD shall have been evaluated by UL and found acceptable for mounting in a plenum or other air handling compartment. Manufacturer shall supply a copy of the UL plenum evaluation upon request.

B. The VFD shall be tested to UL 508C and bear the appropriate UL label. VFDs designated for use in Canada shall have C-UL certifications.

C. The VFD shall be CE marked and conform to the European Union Electro Magnetic Compatibility directive.

D. The VFD shall be UL listed for a short circuit current rating of 100 kA and labeled with this rating either in the instruction manual or with a drive marking, in accordance with UL.

E. The VFD manufacturer shall supply the VFD and all necessary controls as herein specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of twenty years.

F. VFD shall be manufactured in ISO 9001, 2000 certified facilities.

II. PRODUCTS

A. The VFD shall convert incoming fixed frequency three-phase AC power into an adjustable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor de-rating. Additionally, the VFD shall have the capability to control non-salient permanent magnet (PMAC) motors up to 22kW (30 HP).

When properly sized, the VFD shall allow the motor to produce full rated power at rated motor voltage, current, and speed without using the motor's service factor. VFDs utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

B. The VFD shall include an input full-wave bridge rectifier and maintain a fundamental (displacement) power factor near unity regardless of speed or load.

C. The VFD shall be capable of full output current at frequencies in the range of 0 to 120 Hz without de-rating.

D. The VFD shall have a dual 5% impedance DC link reactor on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The DC link reactors shall be non-saturating. DC link reactors using swinging chokes that do not provide full harmonic filtering throughout the entire load range are not acceptable.

E. The VFD shall be able to provide full rated output current continuously and up to 110% of rated output current for 60 seconds.

F. The VFD shall provide full motor torque at any selected frequency from 20 Hz to base speed while providing a variable torque V/Hz output at reduced speed. This is to allow driving direct drive fans without high speed de-rating or low speed excessive magnetization, as would occur if a constant torque V/Hz curve was used at reduced speeds. Breakaway current of 130% shall be available for 0.5 seconds.

G. A programmable automatic energy optimization selection feature shall be provided standard in the VFD. This feature shall automatically and continuously monitor the motor’s speed and load to adjust the applied voltage to maximize energy savings.

H. The VFD must be able to operate a direct drive fan through its full operating range.

I. VFD shall be capable of controlling multiple induction motors simultaneously. Multiple motor operation will require additional protective devices per motor.

J. Input and output power circuit switching shall be accomplished without interlocks or damage to the VFD. Switching rate may be up to 1 time per minute on the input and unlimited on the output.

K. An automatic motor adaptation algorithm shall be provided in the VFD to measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to perform the test.

L. VFD shall minimize the audible motor noise through the use of an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD operation while reducing motor noise. VFDs with fixed carrier frequency are not acceptable.

M. All VFDs rated at 480V and below shall contain integral EMI filters to attenuate radio frequency interference conducted to the AC power line.

N. Galvanic and/or optical isolation shall be provided between the VFD’s power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents.

III. PROTECTIVE FEATURES

A. A minimum of Class 20 I2t electronic motor overload protection for single motor applications shall be provided. Overload protection shall automatically compensate for changes in motor speed.

B. The VFD shall provide protection against input transients, loss of AC line phase, output short circuit, output ground fault, over voltage, under voltage, VFD over temperature and motor over temperature. The VFD shall display all faults in plain language. Codes are not acceptable.
C. The VFD shall be protected from input phase loss. The VFD should be able to protect itself from damage and indicate the phase loss condition. During an input phase loss condition, the VFD shall be able to be programmed to either trip off while displaying an alarm, issue a warning while running at reduced output capacity, or issue a warning while running at full commanded speed. This function is independent of which input power phase is lost.
D. The VFD shall be protected from under voltage. The VFD shall provide full rated output power with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output power, without faulting, with an input voltage as low as 85% of the nominal voltage as required by EN/IEC 61800-3.
E. The VFD shall be protected from over voltage. The VFD shall continue to operate without faulting with a momentary input voltage higher than 110% of the nominal voltage.
F. VFD design shall comply with IEC Part 34-17 to prevent breakdown of the motor winding insulation.
G. The VFD shall incorporate a programmable motor preheat feature which provides the motor stator with a controlled level of current to keep the motor warm and prevent condensation build up in idle motors operating in damp environments. .
H. VFD shall include a "signal loss detection" algorithm with adjustable time delay to sense the loss of an analog input signal. It shall also include a programmable time delay to eliminate nuisance signal loss indications. The functions after detection shall be programmable.
I. VFD shall function normally when the keypad is removed while the VFD is running. No warnings or alarms shall be issued as a result of removing the keypad.
J. VFD shall be capable of catching a rotating motor operating forward or reverse up to full speed without VFD fault or component damage.
K. Selectable over-voltage control shall be provided to protect the VFD from power regenerated by the motor while maintaining control of the driven load.
L. VFD shall include current sensors on all three output phases to accurately measure motor current, protect the VFD from output short circuits, output ground faults, and act as a motor overload. If an output phase loss is detected, the VFD will trip off and identify which of the output phases is low or lost.
M. If the temperature of the VFD's heat sink rises to approximately 80°C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. It shall also be possible to program the VFD so that it reduces its output current limit value if the VFD's temperature becomes too high. The VFD shall automatically increase the carrier frequency and current limit to normal values as the heat sink temperature decreases.
N. The VFD shall store in memory the last 10 alarms. A description of the alarm and the relative sequences of the alarms shall be recorded.

IV. INTERFACE FEATURES

A. Hand, Off and Auto keys shall be provided to start and stop the VFD and determine the source of the speed reference. It shall be possible to either disable these keys or password protect them from undesired operation.
B. The VFD shall be programmable to provide a digital output signal to indicate whether the VFD is in Hand or Auto mode. This is to alert the Building Automation System whether the VFD is being controlled locally or by the Building Automation System.
C. The VFD shall be provided with a keypad with alphanumeric, backlit display. The display shall be capable of remote mounting up to 10 ft. from the VFD. Main Menu password protection shall be provided to guard against unauthorized parameter changes.
D. All VFDs shall have the same customer interface. The keypad and display shall be identical and interchangeable for all sizes of VFDs.
E. To set up multiple VFDs, it shall be possible to upload all setup parameters to the VFD's keypad, place that keypad on all other VFDs in turn and download the setup parameters to each VFD. To facilitate setting up VFDs of various sizes, it shall be possible to download from the keypad only size independent parameters. Keypad shall provide visual indication of copy status.
F. Display shall be programmable to communicate in multiple languages including English, Spanish and French.
G. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
H. A quick setup menu with factory preset typical HVAC parameters shall be provided on the VFD.
I. A two-feedback PI controller to control the speed of the VFD shall be standard.
    a) This controller shall accept up to two feedback signals. It shall be programmable to follow the sum of the feedback signals, a preset reference (common set point or up to 8 individual setpoints), or the sum of both. It shall also be possible to calculate the controlling feedback signal as the average, maximum, minimum or the difference between two feedback signals. The VFD shall be able to apply scaling to the feedback signal.
    b) For fan flow tracking applications, the VFD shall be able to calculate the square root of any or all individual feedback signals so that a pressure sensor can be used to measure air flow.
    c) The VFD's PI controller shall be able to actively adjust its set point based on flow. This allows the VFD to compensate for a pressure feedback sensor which is located near the output of the pump rather than out in the controlled system.
J. Customized meter displays shall be available. They shall include at a minimum, speed/flow, pressure, and power units relative to motor speed.
K. Programmable Sleep Mode shall be able to stop the VFD. When its output frequency drops below set "sleep" level for a specified time, the VFD may be programmed to stop. When the VFD's speed is being controlled by its PI controller, it shall be possible to

program a "wake-up" feedback value that will cause the VFD to start. To avoid excessive starting and stopping of the driven equipment, it shall be possible to program a minimum run time before sleep mode can be initiated and a minimum sleep time for the VFD.

L. A run permissive circuit shall be provided to accept a "system ready" signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of initiating an output "run request" signal to indicate to the external equipment that the VFD has received a request to run.

M. VFD shall be programmable to sense the loss of load. The VFD shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. To ensure against nuisance indications, this feature must be based on estimated motor torque, not current, and must include a proof timer to keep brief periods of no load from falsely triggering this indication.

N. Standard Control and Monitoring Inputs and Outputs
   i. Four dedicated, programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.
   ii. Two terminals shall be programmable to act as either as digital or analog outputs.
   iii. Two programmable relay outputs, Form C 250 VAC, 3 A, shall be provided for remote indication of VFD status.
      a) Each relay shall have an adjustable on delay / off delay time.
   iv. Two programmable analog inputs shall be provided that can be either direct- or reverse-acting.
      b) Each shall be independently selectable to be used with either an analog voltage or current signal.
      c) The maximum and minimum range of each shall be able to be independently scalable from 0 to 10 V dc and 0 to 20 mA.
      d) A programmable low-pass filter for either or both of the analog inputs must be included to compensate for noise.
   v. Two programmable analog current outputs (0/4 to 20 mA) shall be provided for indication of VFD status. This output shall be programmable to show the reference or feedback signal supplied to the VFD and for VFD output frequency, current and power. It shall be possible to scale the minimum and maximum values of the outputs.
   vi. It shall be possible through serial bus communications to read the status of all analog and digital inputs of the VFD.
   vii. It shall be possible to command all digital and analog output through the serial communication bus.

O. Standard programmable firefighter's override mode allows a digital input to control the VFD and override all other local or remote commands. It shall be possible to program the VFD so that it will ignore most normal VFD safety circuits including motor overload. The VFD shall display FIREMODE whenever in firefighter's override mode. Fire mode shall allow selection of forward or reverse operation and the selection of a speed source or preset speed, as required to accommodate local fire codes, standards and conditions.

P. The VFD shall be able to store load profile data such as counters for operating hours, running hours, and kilowatt-hours, to assist in analyzing the system demand and energy consumption over time.

Q. The VFD shall include a sequential logic controller to provide advanced control interface capabilities. This shall include:
   i. Comparators of VFD analog values to programmed trigger values
   ii. Logic operators to combine up to three logic expressions using Boolean algebra
   iii. Delay timers
   iv. A 20-step programmable structure

V. SERIAL COMMUNICATIONS

A. The VFD shall include a standard EIA-485 communications port and capabilities to be connected to the following serial communication protocols at no additional cost and without a need to install any additional hardware or software in the VFD:
   i. BACnet MS/TP
   ii. Johnson Controls Metasys N2
   iii. Modbus RTU
   iv. Siemens FLN P1
   v. FC protocol

VI. ADJUSTMENTS

A. The VFD shall have a manually adjustable carrier frequency that can be adjusted in 1 kHz increments up to 6 kHz, 2 kHz increments up to 12 kHz, and 4 kHz up to 16 kHz to allow the user to select the desired operating characteristics. The VFD shall also be programmable to automatically reduce its carrier frequency to avoid tripping due to thermal loading.

B. Two independent setups shall be provided.

C. Eight preset references per setup shall be provided for a total of 16.

D. Each setup shall have two programmable ramp up and ramp down times. Acceleration and deceleration ramp times shall be adjustable over the range from 1 to 3,600 seconds. The shape of these ramps shall be automatically contoured to ensure no-trip acceleration and deceleration.

E. Each setup shall be programmable for a unique current limit value. If the output current from the VFD reaches this value, any further attempt to increase the current produced by the VFD will cause the VFD to reduce its output frequency to reduce the load on the VFD. If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: external interlock, under-voltage, over-voltage, current limit, over temperature, and VFD overload.

F. The number of restart attempts shall be selectable from 0 through 20 or infinity and the time between attempts shall be adjustable from 0 through 600 seconds.

G. An automatic "start delay" may be selected from 0 to 10 seconds. During this delay time, the VFD shall be programmable to either apply no voltage to the motor or apply a DC braking current if desired.
H. Three programmable critical frequency lockout ranges to prevent the VFD from operating the load at a speed that causes vibration in the driven equipment shall be provided. Semi-automatic setting of lockout ranges shall simplify the set-up.
I. When incorporated in the air handler's design with an optional electro-mechanical bypass, provide a manual 2-contactor bypass consisting of a door interlocked main disconnect pad lockable in the off position, a built-in motor starter and a three position DRIVE/OFF/BYPASS switch controlling two contactors. In the DRIVE position, the motor is operated at an adjustable speed from the VFD. The VFD can be remotely controlled in this position with a pilot relay and analog signal or can be controlled manually using the hand function on the VFD LCD. In the OFF position, the motor and VFD are disconnected. In the BYPASS position, the motor is operated at full speed form the AC power line. In case of an external safety fault, a customer supplied normally closed dry contact shall be able to stop the motor whether in DRIVE or BYPASS mode.

VII. SERVICE CONDITIONS

A. Ambient temperature, continuous, full speed, full load operation:
   i. VFD shall be available in enclosure types: UL Type 1 (NEMA 1) and IP20.
   ii. VFD shall be able to operate at full output current in the temperature range of 0 to 40°C (32 to 104°F).
   iii. VFD must be capable of operation at 50°C (122°F). The nameplate shall indicate any reduced VFD output current.
   iv. VFD shall be capable of operation to a minimum of -10°C (14°F) with reduced performance.
B. VFD shall be capable of operation in an environment with a relative humidity of 0% to 95%, non-condensing.
C. VFD shall be capable of operation up to an elevation to 1000m (3,280 feet) without de-rating.
D. VFD shall be capable of full output current with an AC line voltage variation of -10 to +10% from nominal input voltage.
E. All VFDs shall be plenum rated.
F. VFD shall require no side clearance for cooling. All power and control wiring shall be done from the bottom.

VIII. QUALITY ASSURANCE

A. To ensure quality, the VFD shall be tested by the manufacturer. The VFD shall drive a motor connected to a dynamometer at full load and speed and shall be cycled during the automated test procedure.

IX. SUBMITTALS

A. This specification lists the minimum VFD performance requirements for this project. Each supplier shall list any exceptions to the specification. If no departures from the specification are identified, the supplier shall be bound by the specification.
B. Total harmonic distortion level estimation. If requested, the manufacturer shall perform an analysis to initially demonstrate the supplied equipment will meet the IEEE 519-1992 recommendations after installation. In such instances, the owner or engineer shall provide the manufacturer with detailed electrical power single line diagram showing all impedances in the power path to the VFDs. Analysis shall provide the estimated total harmonic distortion levels. Point of common coupling shall be the secondary of the utility transformer. Any additional harmonic filtering equipment required to meet the IEEE 519-1992 recommendations shall not be the responsibility of the HVAC manufacturer.

X. EXECUTION

A. Start-up Service - The manufacturer shall provide start-up commissioning of the VFD and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. Sales personnel and other agents who are not factory certified shall not be acceptable as commissioning agents. Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system.
B. Warranty - The VFD shall be warranted by the manufacturer for a period of 36 months from initial start-up or 42 months from date of shipment, whichever is less. The warranty shall include replacement equipment or parts as well as a labor allowance for expenses incurred by the manufacturer to provide factory authorized on-site service.

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Division 01 Specification Sections
B. Division 23 Sections

1.2 SUMMARY

A. The heat pump air conditioning system shall be a variable capacity multi-zone series, ported type. The system shall consist of three (3) wall mounted indoor units with a wireless remote controller, connected to a compact horizontal discharge outdoor unit which shall be of an inverter driven heat pump design. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. The system components shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.

B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).

C. The units shall be rated in accordance with Air-conditioning, Heating and Refrigeration Institute's (AHRI) Standard 240 and bear the AHRI Certification label.

D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to product and manufacturing quality and environmental management and protection set by the International Standard Organization (ISO).

E. A dry air holding charge shall be provided in the indoor section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and carefully handled according to the manufacturer's recommendations.

B. The wireless remote controller, for the wall mounted and floor standing indoor units, shall be shipped inside the carton and packaged with the indoor unit and shall be able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

C. The remote controller, for the ceiling suspended, ceiling recessed and ducted indoor units, either wireless or wired, shall be shipped separately.

1.8 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Seven (7) years from date of Installation.
b. For Parts: **Five** (5) years from date of Installation.
c. For Labor: **One** (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Trane/Mitsubishi MVX variable capacity multi-zone ported or comparable product by one of the following:
1. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
2. Trane; a business of American Standard companies.
3. Daikin

2.2 INDOOR UNITS (5 TONS OR LESS)

A. General:
1. The wall-mounted indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

B. Unit Cabinet:
1. The casing shall have a white finish – Munsell 1.0Y 9.2/0.2.
2. Multi directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining are required.
3. There shall be a separate back plate which secures the unit firmly to the wall.

C. Fan:
1. The indoor fan shall be statically and dynamically balanced to run on a single motor with permanently lubricated bearings.
2. An integral, motorized, multi-position, horizontal air sweep vane shall provide for uniform air distribution, up and down. Vane shall have 5 selectable positions plus AUTO (Controls position based upon mode, microprocessor shall automatically determine the vane angle to provide the optimum room temperature distribution) and SWING (Continuously moves up and down). In OFF mode the horizontal vane shall return to the closed position.
3. A motorized adjustable vertical guide vane shall be provided with the ability to change the airflow from side to side (left to right). Vane shall be positioned by a stepper motor driven by the indoor unit control microprocessor. Vane shall have 5 selectable positions and SWING (Continuously moves left and right).
4. The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of six (6) speed settings, Quiet, Low, Med, High, Super High and Auto (2 ton unit does not have Quiet setting).

D. Filter:
1. Return air shall be filtered by means of two (2) easily removable, washable Nano Platinum Filters, an Electrostatic Anti-Allergy Enzyme Filter and a Deodorizing Filter with ceramic surface and nanotechnology for high-powered odor absorption.

E. Coil:
1. The indoor unit coil shall be of nonferrous construction with smooth plate fins on copper tubing.
2. The tubing shall have inner groves for high efficiency heat exchange.
3. All tube joints shall be brazed with silver alloy.
4. The coils shall be pressure tested at the factory.
5. A sloped, corrosion resistant condensate pan with drain shall be provided under the coil.
6. A drain pan level switch (SS610E), designed to connect to the control board, shall be provided, if required, and installed in the condensate pan to prevent condensate from overflowing.

F. Electrical:
1. The unit electrical power shall be 208-230 volts, 1-phase, 60 hertz.
2. The system shall be equipped with A-Control – a system directing that the indoor unit be powered directly from the outdoor unit using a 3-wire, 14 gauge AWG connections plus ground.
3. The indoor unit shall not have any supplemental electrical heat elements.

G. Controls:
1. The unit shall include an IR receiver for wireless remote control flexibility
2. The unit shall ship with a backlit wireless handheld remote with the unit.
3. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. General:
1. The outdoor unit are specifically designed to work with the indoor units. The outdoor units must have a thermally fused powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.
2. If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, etc.
3. Outdoor unit shall have a sound rating no higher than 55 dB(A). If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.
4. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.
5. The outdoor unit shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.
6. The outdoor unit shall be capable 100% heating capacity to -5°F. The outdoor unit shall be capable of guaranteed operation in heating mode down to -13°F ambient and cooling mode up to 115°F without additional restrictions on line length & vertical separation beyond those published in respective product catalogs. Models with capacity data for

required temperature range published as "for reference only" are not considered capable of guaranteed operation and are not acceptable. If an alternate manufacturer is selected, any additional material, cost, and labor to meet ambient operating range and performance shall be incurred by the contractor.

B. Unit Cabinet:
   1. The casing shall be fabricated of galvanized steel, bonderized, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection. Assembly hardware shall be cadmium plated for weather resistance.
   2. Cabinet color shall be Munsell 3Y 7.8/1.1.
   3. Two (2) mild steel mounting feet, traverse mounted across the cabinet base pan, welded mount, providing four (4) slotted mounting holes shall be furnished. Assembly shall withstand lateral wind gust up to 155 MPH to meet applicable weather codes. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.

C. Fan:
   1. The unit shall be furnished with a direct drive propeller type fan.
   2. The outdoor unit fan motor shall be a direct current (DC) motor and have permanently lubricated bearings.
   3. The fan motor shall be mounted for quiet operation.
   4. The fan shall be provided with a raised guard to prevent contact with moving parts.
   5. The outdoor unit shall have horizontal discharge airflow.

D. Refrigerant and Refrigerant Piping
   1. R410A refrigerant shall be required for systems.
   2. Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.
   3. Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the equipment manufacturer and installed in accordance with manufacturer recommendations.
   4. All refrigerant piping must be insulated with ½" closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.
   5. Refrigerant line sizing shall be in accordance with manufacturer specifications.

E. Coil:
   1. The outdoor unit coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
   2. The coil fins shall have a factory applied corrosion resistant Blue Fin finish. Uncoated aluminum coils/fins are not allowed.
   3. The coil shall be protected with an integral metal guard.
   4. Refrigerant flow from the outdoor unit shall be regulated by means of an electronically controlled, precision, linear expansion valve.
   5. Outdoor unit shall be pre-charged with sufficient R-410a refrigerant for up to twenty five (25) feet of refrigerant piping.
   6. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero),

elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102.

7. All refrigerant connections between outdoor and indoor units shall be flare type.

F. Compressor:
1. The compressor shall be a high performance, hermetic, inverter driven, variable speed, dual rotary type manufactured by Mitsubishi Electric Corporation.
2. The compressor motor shall be direct current (DC) type equipped with a factory supplied and installed inverter drive package.
3. The compressor will be equipped with internal thermal overload protection.
4. The outdoor unit must have the ability to operate over the full capacity range with a maximum height difference of 40 feet and refrigerant tubing length of 65 feet for capacities up to 12,000 BTU/h, and a maximum height difference of 50 feet and refrigerant tubing length of 100 feet for capacities 15,000 BTU/h and above between indoor and outdoor units.
5. There shall be no need for line size changes. Filters, sight glasses, and traps shall not be used, and no additional refrigerant oil shall be required.
6. The compressor shall be mounted so as to avoid the transmission of vibration.

G. Electrical:
1. The outdoor unit electrical power supply shall be 208/230 volts, 1-phase, 60 hertz.
2. The unit shall be capable of satisfactory operation within voltage limits of 187 volts to 253 volts.
3. The outdoor unit shall be controlled by microprocessors located in the indoor unit and outdoor unit. A 12 to 24 volt DC data stream shall communicate between the units providing all necessary information for full function control.

2.4 CAPACITIES AND CHARACTERISTICS

A. See Equipment Schedule on drawing.

2.5 CONTROLS

A. Overview
1. The control system shall consist of a minimum of one microprocessor on each indoor unit and one in the outdoor unit, communicating via A-Control data over power transmission. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from the wired or wireless controller, providing emergency operation and controlling the outdoor unit. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Indoor units shall have the ability to control supplemental heat via connector CN24 and a 12 VDC output.
2. 5.For A-Control, a three (3) conductor 14 gauge AWG wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

If code requires a disconnect mounted near the indoor unit, a TAZ-MS303 3-Pole Disconnect shall be used – all three conductors must be interrupted.

3. The system shall be capable of automatic restart when power is restored after power interruption. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the wired controller panel.
4. A remote controller needs to be selected and ordered separately from the unit unless the indoor unit is a wall mounted (excludes PKA), floor mounted or one-way ceiling recessed unit.

B. Remote Controllers
   1. Backlit Simple MA Remote Controller:
      a. On wall mount units the Backlit Simple MA Remote Controller shall require a MAC-334IF-E Interface for communication.
      b. The Backlit Simple MA Remote Controller shall be capable of controlling up to 16 indoor units (defined as 1 group). When grouping M-Series units each unit requires a MAC-334IF-E Interface.
      c. The Backlit Simple MA Remote Controller shall only be used in same group with another Backlit Simple MA Remote Controller, with up to two remote controllers per group.

Simple MA Remote Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Operation Mode	Switches between Cool/Drying/Auto/Fan/Heat. Operation modes vary depending on the air conditioner unit.	Each Group	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *1: Centrally Controlled is displayed on the remote controller for prohibited functions.	N/A	Each Group *1
Display Indoor Unit Intake Temp	Measures and displays the intake temperature of the indoor unit when the indoor unit is operating.	N/A	Each Group
Display Backlight	Pressing the button lights up a backlight. The light automatically turns off after a certain period of time. (The brightness settings can be selected from Bright, Dark, and Light off.)	N/A	Each Unit
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode. *2 The display for test run mode will be the same as for normal start/stop (does not display “test run”).	Each Group	Each Group *2
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit.	Each Group	N/A
Set Temperature Range Limit	Set temperature range limit for cooling, heating, or auto mode.	Each Group	Each Group

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting:
   1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
   2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 238239 - UNIT HEATERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Deliver the following products to the Electric (Sub)Contractor for installation and connection to power wiring:

1. Line voltage thermostats.
2. Remote mounted speed switches.

1.03 RELATED WORK SPECIFIED ELSEWHERE

Wiring of Mechanical Equipment: Section 230512
Motor Controls: Section 230512

1.04 SUBMITTALS

A. Product Data: Catalog cuts, specifications, installation and maintenance instructions for each type of heater specified.

B. Schedule: List manufacturer, unit type, model number, and performance data for each unit heater.

C. Contract Closeout Submittals:

1. Operation and Maintenance Data: Submit 2 copies to the Engineer, incorporated within maintenance manuals, covering the installed products.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Unit heaters shall be UL listed.

PART 2 PRODUCTS

2.01 PROPELLER TYPE UNIT HEATERS

A. Unit Casing: Constructed of steel sheet formed, reinforced, and braced for rigidity, with steel louvers or deflectors with sufficient rigidity to prevent vibration at all fan speeds.

1. Materials:
   a. Galvanized Steel Sheet: ASTM A 526, phosphatized; with G90 hot-dip process zinc coating complying with ASTM A 525.
   b. Cold-Rolled Steel Sheet: ASTM A 366, cleaned, degreased and phosphatized.

2. Factory Finish: Minimum 2 coat baked enamel finish on exposed surfaces, color as directed.
3. Horizontal Delivery Units: Adjustable horizontal and vertical louvers.
4. Vertical Delivery Units: Deflector mounted outside fan orifice.
   a. Radial louver deflector.

B. Heating Coils: Mechanically bonded aluminum fins with seamless copper tubing for hot water under 200 psig and steam under 75 psig; and red or admiralty brass tubing for hot water over 200 psig and steam over 75 psig; and factory tested at 300 psig air pressure under water.

C. Fan Assembly:

1. Fan: Multiple blade propeller type, statically and dynamically balanced, and directly connected to electric motor.
2. Motor: Single phase, totally enclosed electric motor of the permanent split capacitor or shaded pole type, with resilient mounting, terminal box for wiring connections, built-in overload protection, and ball or sleeve bearings with oilers, or permanently lubricated bearings.

D. Control: Line voltage thermostat.

2.02 CABINET TYPE UNIT HEATERS

A. Unit Casing: Constructed of steel sheet formed, reinforced and braced for rigidity, with stamped grilles.

1. Materials:
   a. Galvanized Steel Sheet: ASTM A 526, phosphatized; with G90 hot-dip process zinc coating complying with ASTM A 525.
   b. Cold-Rolled Steel Sheet: ASTM A 366, cleaned, degreased and phosphatized.
2. Factory Finish: Minimum 2 coat baked enamel finish on exposed surfaces, color as directed.
3. Insulation: Insulate interior surfaces of casing panels with 1/2 inch glass fiber meeting NFPA 90A requirements.
4. Vertical Units: Minimum 18 gage construction with removable front panel.
5. Horizontal Units: Minimum 18 gage construction with hinged bottom panel.

B. Heating Coils: Seamless copper tubing with mechanically bonded aluminum fins, designed for 150 psig working pressure for hot water and steam applications, and factory tested at 250 psig air pressure under water.

C. Fan Assembly: Blow thru design.

1. Fans: Forward curved centrifugal type, double width, statically and dynamically balanced, and directly connected to electric motor.
2. Motors: Three speed, single phase electric motors of the permanent split capacitor or shaded pole type, with resilient mounting, built-in overload protection with automatic reset, and ball or sleeve bearings with accessible oilers, or permanently lubricated bearings.

D. Filter Section: Built-in filter frame mounted at air inlet with 2 sets of disposable air

filters.

1. Vertical Units: Filters removable without removing front panel for cabinet type units.
2. Horizontal Units: Filters removed by pivoting hinged bottom panel.

E. Control: Unit mounted line voltage thermostats, and unit mounted speed controller with off position.

2.03 KICK-SPACE HEATERS

A. Kickspace heater designed for installation under cabinets with discharge air grille and speed switch accessible from front of unit through grille. Unit shall be U.L. approved. Provide unit with self-contained aquastat to prevent operation with water temperature below 140□F.

B. Heating Coils: Mechanically bonded aluminum fins with seamless copper tubing for hot water with factory mounted air vent.

C. Fan Assembly:

1. Fan: Multiple blade centrifugal type, statically and dynamically balanced, and directly connected to electric motor.
2. Motor: Two-speed, triple ball bearing, single phase, totally enclosed electric motor of the permanent split capacitor or shaded pole type, with resilient mounting, terminal box for wiring connections, built-in overload protection, and ball or sleeve bearings with oilers, or permanently lubricated bearings.

D. Control: Line voltage thermostat.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturers printed installation instructions, unless otherwise specified.

END OF SECTION 238239

SECTION 260009 – ELECTRICAL SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 WORK IN EXISTING BUILDINGS

A. All existing material, fixtures, and equipment that have been removed shall not be used again unless specifically required by the Drawings or Specifications.

B. Removals, Replacements, Adjustments

1. The Contractor shall remove, relocate, replace, adjust, or adapt, all existing conduit, wiring and other electric equipment or apparatus, as required, to provide a complete installation.

2. The Work shall include, providing all materials, all necessary extensions, connections, cuttings, repairing, adapting and other Work incidental thereto, together with such temporary connections as may be required to maintain service pending the completion of the permanent Work. All Work shall be left in good working order and in a condition equal to the adjacent new or existing Work.

C. Care in Removing Existing Conductors

1. The Contractor shall use due care and diligence in removing existing conductors from existing conduits to prevent conductors from breaking and becoming an irretrievable obstruction within the conduits.

D. Cutting and Repairing

1. Whenever the cutting, or drilling, or removal of any part of the structure (ceilings, walls, floors, shelving, bookcases, partitions, etc.), is required to remove, relocate, alter or install any article of electrical equipment (including conduits, boxes, fittings, etc.), the Contractor shall perform all cutting, drilling, etc., and remove the section of structure required. After removal and installation of the electric equipment, the Contractor shall repair the section of structure, as directed by the Schools, Architect and contract documents, with new materials, equal to that of adjacent structure of the same type.

   Note that in general, all holes through existing structures for conduit installation shall be core drilled, unless prior written approval is provided by the School.

   Contractor shall use extreme care when core drilling to avoid damaging the existing infrastructure.

2. Whenever holes are cut in fire-rated walls or floor slabs to permit the installation of conduit or electrical equipment, these holes shall be repaired with material that will restore the fire rating of the wall or floor slab to its original condition.

3. The Contractor shall paint all repaired areas of the building. The paint shall match the paint of adjacent surface areas, or extend to the nearest architectural break-line, as directed.

4. Wherever any part of the structure is marred or damaged, the Contractor shall repair the damaged or marred areas of the structure.

5. Where a piece of electrical equipment is removed, the Contractor shall finish that part of the surface to match surroundings.

E. Damaged Apparatus: Should any damage, due to the execution of this Contract, occur to the furniture, fixtures, or any equipment or apparatus, such damage shall be properly repaired and/or replaced by the Contractor without charge.

F. Non-Interruption of Services

1. It is imperative that all existing services (electric, light, power, fire alarm, telecommunications, etc.) be always kept in operation, unless prior written approval is received from the Authority.

2. Provide fire watch services, as necessary, during disruption of fire alarm system.

1.2 TESTS

A. The Contractor shall demonstrate to the Authority operation of all equipment and systems. All tests shall be completed to the satisfaction of the Authority. Each test shall be performed as indicated in the individual specification section.

1.3 CLEANING AND REPAIR

A. On completion of installation, inspect interior and exterior of installed equipment. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

B. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, electrical equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Supplemental requirements applicable to Work specified in Division 26.

B. Related Requirements:

1. Section 01 00 00 “General requirements" for coordination, shop drawings, installation, testing, and inspection requirements.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. A: Ampere, unit of electrical current.
2. AC or ac: Alternating current.
3. AFCI: Arc-fault circuit interrupter.
4. AIC: Ampere interrupting capacity.
5. AL, Al, or ALUM: Aluminum.
6. ASD: Adjustable-speed drive.
7. ATS: Automatic transfer switch.
8. AWG: American wire gauge; see ASTM B258.
9. BAS: Building automation system.
10. BIL: Basic impulse insulation level.
11. BIM: Building information modeling.
12. CAD: Computer-aided design or drafting.
13. CB: Circuit breaker.
14. CO/ALR: Copper-aluminum, revised.
15. CU or Cu: Copper.
16. CU-AL or AL-CU: Copper-aluminum.
17. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
18. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
19. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
20. dBm: Decibel absolute power with respect to 1 mW.
21. DC or dc: Direct current.
22. DCOA: Designated critical operations area.
23. DDC: Direct digital control (HVAC).
24. EGC: Equipment grounding conductor.
25. EMF: Electromotive force.

26. EMI: Electromagnetic interference.
27. EPM: Electrical preventive maintenance.
28. EPS: Emergency power supply.
29. EPSS: Emergency power supply system.
30. ESS: Energy storage system.
31. fc: Footcandle, a unit of illuminance equal to one lumen per square foot.
32. FLC: Full-load current.
33. ft.: Foot.
34. GEC: Grounding electrode conductor.
35. GFCI: Ground-fault circuit interrupter.
36. GFPE: Ground-fault protection of equipment.
37. GND: Ground.
38. HACR: Heating, air conditioning, and refrigeration.
39. HDPE: High-density polyethylene.
40. HID: High-intensity discharge.
41. HP or hp: Horsepower.
42. HVAC: Heating, ventilating, and air conditioning.
43. Hz: Hertz.
44. IBT: Intersystem bonding termination.
45. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
46. IP: Ingress protection rating (enclosures); Internet protocol (communications).
47. IR: Infrared.
48. IS: Intrinsically safe.
49. IT&R: Inspecting, testing, and repair.
50. ITE: Information technology equipment.
51. kAIC: Kiloampere interrupting capacity.
52. kcmil or MCM: One thousand circular mils.
53. kV: Kilovolt.
54. kVA: Kilovolt-ampere.
55. kVAr or kVAR: Kilovolt-ampere reactive.
56. kW: Kilowatt.
57. kWh: Kilowatt-hour.
58. LAN: Local area network.
59. lb: Pound (weight).
60. LCD: Liquid-crystal display.
61. LCDI: Leakage-current detector-interrupter.
62. LED: Light-emitting diode.
63. LRC: Locked-rotor current.
64. MCC: Motor-control center.
65. MG set: Motor-generator set.
66. MLO: Main lugs only.
67. MVA: Megavolt-ampere.
68. mW: Milliwatt.
69. MW: Megawatt.
70. MWh: Megawatt-hour.
71. NC: Normally closed.
72. NiCd: Nickel cadmium.
73. NIU: Network interface unit.
74. NO: Normally open.
75. NPT: National (American) standard pipe taper.
76. OCPD: Overcurrent protective device.

77. PCS: Power conversion system.
78. PCU: Power-conditioning unit.
79. PF or pf: Power factor.
80. PoE: Power over Ethernet.
81. PV: Photovoltaic.
82. PVC: Polyvinyl chloride.
83. pW: Picowatt.
84. RFI: Radio-frequency interference (electrical); Request for interpretation (contract).
85. RMS or rms: Root-mean-square.
86. RPM or rpm: Revolutions per minute.
87. SCADA: Supervisory control and data acquisition.
88. SCR: Silicon-controlled rectifier.
89. SPD: Surge protective device.
90. sq.: Square.
91. SWD: Switching duty.
92. TCP/IP: Transmission control protocol/Internet protocol.
93. TEFC: Totally enclosed fan-cooled.
94. TR: Tamper resistant.
95. TVSS: Transient voltage surge suppressor.
96. UL: Underwriters Laboratories, Inc. (standards) or UL LLC (services).
97. UL CCN: UL Category Control Number.
98. UPS: Uninterruptible power supply.
99. USB: Universal serial bus.
100. UV: Ultraviolet.
101. V: Volt, unit of electromotive force.
102. V(ac): Volt, alternating current.
103. V(dc): Volt, direct current.
104. VA: Volt-ampere, unit of complex electrical power.
105. VAr: Volt-ampere reactive, unit of reactive electrical power.
106. VFC: Variable-frequency controller.
107. VOM: Volt-ohm-multimeter.
108. VPN: Virtual private network.
109. W: Watt, unit of real electrical power.
110. Wh: Watt-hour, unit of electrical energy usage.
111. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit.
7. EPEC-40: Schedule 40 electrical HDPE underground conduit.
8. EPEC-80: Schedule 80 electrical HDPE underground conduit.
9. EPEC-A: Type A electrical HDPE underground conduit.
10. EPEC-B: Type B electrical HDPE underground conduit.
11. ERMC: Electrical rigid metal conduit.
12. ERMC-A: Aluminum electrical rigid metal conduit.
13. ERMC-S: Steel electrical rigid metal conduit.

14. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
15. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
16. ERMC-SS: Stainless steel electrical rigid metal conduit.
17. FMC: Flexible metal conduit.
18. FMC-A: Aluminum flexible metal conduit.
19. FMC-S: Steel flexible metal conduit.
20. FMT: Steel flexible metallic tubing.
21. FNMC: Flexible nonmetallic conduit. See LFNC.
22. HDPE: See EPEC.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERMC-S-G.
38. RMC: See ERMC.
39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.

15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.
17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.
19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: Moisture-, heat-, and oil-resistant thermoplastic cable (machine tool wiring).
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.
38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.
46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: Thermoset rubber, heat-resistant cable (high heat).
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.
59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.

65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
66. THHW: Thermoplastic, heat- and moisture-resistant cable.
67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
68. TW: Thermoplastic, moisture-resistant cable.
69. UF: Underground feeder and branch-circuit cable.
70. USE: Underground service-entrance cable.
71. XHH: Cross-linked polyethylene, heat-resistant cable.
72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Definitions:

1. Basic Impulse Insulation Level: Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
2. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
3. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
4. Designated Seismic System: A system component that requires design in accordance with ASCE/SEI 7, Ch. 13 and for which the Component Importance Factor is greater than 1.0.
5. Direct Buried: Installed underground without encasement in concrete or other protective material.
6. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:
    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.
    c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
    d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
    e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
    f. Device Box: A box with provisions for mounting a wiring device directly to the box.
    g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
    h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
    i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
    j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.

k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
o. Raised-Floor Box: A floor box intended for use in raised floors.
p. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
q. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
r. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
s. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
t. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

7. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
8. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
9. Jacket: A continuous nonmetallic outer covering for conductors or cables.
10. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
11. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
12. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
13. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
14. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
15. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
16. Sheath: A continuous metallic covering for conductors or cables.
17. UL Category Control Number: An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.

18. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:
    a. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by Class 2 or Class 3 power supplies having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
    b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation, in contrast to control-voltage devices that require or contain transformer power supplies. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
    c. Low Voltage: Listed and labeled for use in circuits supplied by Class 1 or other power supplies having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.
    d. Medium Voltage: Listed and labeled for use in circuits supplied by a power supply having rated output greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Parts I and II.

1.3 COORDINATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.
3. Coordinate interruption with systems impacted by outage including, but not limited to, the following:
    a. Exercising generators.
    b. Emergency lighting.
    c. Elevators.
    d. Fire-alarm systems.

1.4 SEQUENCING

A. Conduct and submit results of power system studies, short circuit study and arc flash Hazard analysis before submitting Product Data and Shop Drawings for electrical equipment.

1.5 SCHEDULING

A. Coordinate with school for scheduling .

1.6 ACTION SUBMITTALS

A. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, on which the

following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment and suspension systems will be attached.
3. Size and location of access panels on ceilings.
4. Elevation, size, and route of sprinkler piping.
5. Elevation, size, and route of plumbing piping.
6. Elevation, size, and route of ductwork.
7. Elevation, size, and route of cable tray.
8. Elevation, size, and route of conduit.
9. Elevation and size of wall-mounted and ceiling-mounted equipment.
10. Access panels.
11. Sprinklers.
12. Air inlets and outlets.
13. Control modules.
14. Luminaires.
15. Communications devices.
16. Speakers.
17. Security devices.
18. Fire-alarm devices.
19. Indicate clear dimensions for maintenance access in front of equipment.
20. Indicate dimensions of fully-open access doors.

B. Coordination Drawings for Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

C. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:
   a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
   b. Indicate clear dimensions for fence gates and wall openings.
   c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
   d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
   e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways .
   f. Dimensioned working clearances and dedicated areas around electrical equipment.

D. Coordination Drawings for Electrical service room and ATS rooms:

1. Provide coordination drawing to show all the electrical equipment in large scale plan and elevation including wire trough, conduits along with all the code required clearances between equipment and walls for code compliance installation and review by EOR.

1.7 INFORMATIONAL SUBMITTALS

A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of ARC-Flash Hazard Analysis.
3. Submission of specified coordination drawings.
4. Submission of action submittals specified in Division 26.
5. Orders placed for major electrical equipment.
6. Arrival of major electrical equipment on-site.
7. Preinstallation meetings specified in Division 26.
8. Utility service outages.
9. Utility service inspection and activation.
10. Mockup reviews.
11. Closing of walls and ceilings containing electrical Work.
12. System startup, testing, and commissioning activities for major electrical equipment.
13. System startup, testing, and commissioning activities for emergency lighting.
14. System startup, testing, and commissioning activities for automation systems (BMS, lighting, Emergency generator, HVAC, fire alarm, fire pump, etc.).
15. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
16. Requests for special inspections.
17. Requests for inspections by authorities having jurisdiction.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Provide emergency, operation, and maintenance manuals for each system, equipment, and device listed below:
   a. Transformer, Panel board, switchboard, Fusible Interrupting switch and Lighting control, etc. .
2. Include the following information:
   a. Manufacturer's operating specifications.
   b. User's guides for software and hardware.
   c. Schedule of maintenance material items recommended to be stored at Project site.
   d. Detailed instructions covering operation under both normal and abnormal conditions.
   e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
   f. List of load-current and overload-relay heaters with related motor nameplate data.

g. List of lamp types and photoelectric relays used on Project, with ANSI and manufacturers' codes.
h. Manufacturer's instructions for setting field-adjustable components.
i. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
j. Exterior pole inspection and repair procedures.

B. Software and Firmware Operational Documentation: Provide software and firmware operational documentation in Facility EPM Program Binders, including the following:

1. Software operating and upgrade manuals.
2. Names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.
5. Testing and adjusting of panic and emergency power features.
6. For lighting controls include the following:
   a. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
   b. Operation of adjustable zone controls.

C. Software:

1. Program Software Backup: Provide username and password for approved online or cloud solution .

1.1 MOCKUPS

A. Simple Mockups for Coordinating Accessibility of Electrical Devices around Fixed Furnishings and Equipment:

1. Build simple mockups using art supplies and other inexpensive materials for verification of general arrangement, actual dimensions, and accessibility of rooms selected by Architect prior to fabrication and installation of Work. Depict products from all Divisions requiring coordination including, but not limited to, fixed furnishings, casework, outlet covers and plates, HVAC controls, exposed raceway, exposed plumbing, equipment, and signage.

B. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

1.2 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 26 must be complied.

PART 2 - EXECUTION

2.1 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Architect for resolution of conflicting requirements.

2.2 SYSTEM STARTUP

A. Commissioning Activities:

1. Provide commissioning of lighting control system

2.3 FIELD QUALITY CONTROL

A. Administrant for Low-Voltage Electrical Tests and Inspections:

1. Engage qualified testing and inspecting agency to administer and perform tests and inspections.
2. Administer and perform tests and inspections.

B. Administrant for Control-Voltage Electrical Tests and Inspections:

1. Engage qualified control-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
2. Administer and perform tests and inspections.

C. Administrant for Field Tests and Inspections of Lighting Installations:

1. Engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
2. Administer and perform tests and inspections.

PART 3 - CLOSEOUT ACTIVITIES

A. Demonstration:

1. With assistance from factory-authorized service representatives, demonstrate to Owner's maintenance and clerical personnel and building occupants how to operate the following systems and equipment:
   a. Lighting control devices specified in Section 260923 "Lighting Control Devices."
   b. Lighting control systems specified in Section 260943 "Relay Based Lighting Controls."
   c. All other items specified in individual specification sections under division 26.

2. Provide video recordings of demonstrations to Owner.

B. Training:

1. With assistance from factory-authorized service representatives, train Owner's maintenance personnel on the following topics:
   a. How to adjust, operate, and maintain devices specified in Section 260923 "Lighting Control Devices."
   b. How to adjust, operate, and maintain hardware and software specified in Section 260943 "Relay-Based Lighting Controls."
   c. How to adjust, operate, and maintain control modules specified in Section 262416 "Electronically Operated Circuit-Breaker Panelboards."
   d. How to adjust, operate, and maintain equipment specified in Section 262913 "Manual and Magnetic Motor Controllers."
   e. How to adjust, operate, and maintain luminaires specified in Section 265119 "LED Interior Lighting."
   f. How to adjust, operate, and maintain luminaires and photoelectric controls specified in Section 265619 "LED Exterior Lighting."
   g. How to adjust, operate, and maintain Exit signs specified in Section 265213 "EXIT Lighting."

2. Provide video recordings of training sessions to Owner.

END OF SECTION 260010

SECTION 260519 - ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Fire-alarm wire and cable.
4. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For each conductor and cable indicating lead content.
2. Product Data: For recycled content, indicating postconsumer and pre-consumer recycled content and cost.
3. Product Data: For solvents and adhesives, indicating VOC content.
4. Laboratory Test Reports: For solvents and adhesives, indicating compliance with requirements for low-emitting materials.

C. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Insulated Cable in Raceways:

1. Material: Single conductor copper cable conforming to ASTM B8 with abrasion resistant, moisture and heat resistant polyvinyl chloride insulated, nylon jacketed rated 90C in dry locations and 90C in wet locations. Cable shall be listed by UL as Type THWN-2. All underground raceways for power wiring shall be wired using extra heavy cross-linked polyethylene wire insulation, rated type USE-2/rhw-2.

2. Where cable is designated as multiconductor on the Drawings (10/c for example), the conductors shall have an overall PVC jacket.

3. Wire Sizes: Not smaller than No. 12 AWG for power and lighting and No. 14 AWG for control.

4. Stranding: All 600-volt cable shall be stranded.

5. Product and Manufacturer: Provide material manufactured by one of the following:

a. Alpha Wire Company...

b. American Bare Conductor.

c. Southwire Company

d. Or approved equal.

C. Cable Connectors, Splices and Terminals, Solderless Type:

For stranded wire sizes up to #6 AWG, use compression type.

1. Product and Manufacturer: Provide one of the following:

a) Sta-Kon.

b) Burndy Hylug.

c) Or approved equal.

2. For sizes #4 AWG and above, use either compression type or bolted type with silver plated contact faces.

3. For sizes #250 MCM and larger, use connectors and terminals with at least 2 cable clamping elements or compression indents and provision for at least 2 bolts for joining to apparatus terminal.

D. Cable Markers: Product and Manufacturer: Provide one of the following:

1. Omni-Grip by W.H. Brady Company.

2. Or approved equal.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Wire Company.
2. American Bare Conductor.
3. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit .
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors .

F. Ground Conductor: Insulated .

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.
3. Type USE/RHW for wet and dry location
4. Type MI for emergency as indicated in dwg.

H. Armor: Steel , interlocked.

I. Jacket: PVC applied over armor.

2.3 FIRE-ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Wire & Cable Inc.
2. Genesis Cable Products; Honeywell International, Inc.
3. Vent (PYROTENAX).
4. Prysmian Cables and Systems; Prysmian Group North America.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

1. Lead Content: Less than 300 parts per million.

C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 14 AWG .

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 14 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
3. Multiconductor Armored Cable: NFPA 70, plenum rated red colored jacket metal clad Type MC-FPLP AND MC-FPLR, copper conductors, cables for recessed installation only.

2.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M Electrical Products.
2. ABB, Electrification Products Division.
3. Hubbell Incorporated, Power Systems.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper .
2. Type: One Two hole with standard barrels.
3. Termination: Compression .

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; stranded for all sizes

B. Branch Circuits:

1. Copper; stranded for all sizes
2. Power-Limited Fire Alarm and Control: Copper; stranded for all sizes

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in conduit.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in conduit.

C. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway, Metal-clad cable, Type MC- except for homerun circuits to an electrical panelboard.

E. Raceway from the electrical panelboard shall be provided to a junction box located above the ceiling in the area that the branch circuit serves. Metal-clad cable may be used from this junction box for lighting fixtures, lighting control devices, general use receptacles and for other similar 20A branch circuits.

1.1 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

1.2 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

A. Comply with NFPA 72.

B. Wiring Method: Install wiring in metal pathway.

1. Install plenum rated red colored jacket metal clad cable type MC-FPLP and MC-FPLR in all recessed installation in ceiling and wall.
2. Install 2-hour fire rated fire alarm cable in galvanized ¾” steel conduit in the following locations:
   a. Where subject to physical damage by normal building use.
   b. All exposed exterior installation, mechanical room, electrical room, elevator hoist way, and elevator machine room.
   c. All exposed conduit installation below 96” AFF
   d. Passing through a floor or wall.
   e. All other locations as indicated in NFPA 70 and 72.

3. All exposed interior installation other than the location indicated in item # B(2) above shall be installed in minimum ¾” EMT conduit.
4. Fire alarm cable that is not metal clad or not installed in race way is not permitted.
5. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.
   a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.

6. Signaling Line Circuits: Power-limited fire-alarm cables must not be installed in the same cable or pathway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

G. Wiring to Remote Alarm Transmitting Device: 1 inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

1.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inch of slack.

D. Comply with requirements in Section 284621 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

1.4 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

1.5 TESTING

A. Test each electrical circuit after permanent cables are in place to demonstrate that the circuit and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits.

B. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and before they are put in service with a 1000 volt Megger whose rating is suitable for the tested circuit. Tests shall meet with the applicable specifications of ICEA S-95658/NEMA WC70.

C. The insulation resistance for any given conductor shall not be less than the value recommended by the ICEA or a minimum of I megohm for 600-volt and less service, if not ICEA listed. Any cable not meeting the recommended value, or which fails when tested under full load conditions shall be replaced with a new cable for the full length. Furnish the authority with a copy of the "Megger" test report for EOR's review and approval.

1.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior wall, floor and rated wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

1.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:

1. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
   a. Test wells.
   b. Ground rods.
   c. Grounding arrangements and connections for separately derived systems.
   d. Ground Bus .
2. Instructions for periodic testing and inspection of grounding features at test wells based on NFPA 70B .
   a. Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
   b. Include recommended testing intervals.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Products Division.
2. ERICO; nVent.
3. Siemens Industry, Inc., Energy Management Division.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction. Use green color insulated copper conductor for equipment grounding.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B3.
2. Stranded Conductors: ASTM B8.
3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Isolated Ground Conductors: Insulated with green-colored simulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Grounding Electrode Conductors: Stranded cable.

F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

H. Grounding Bus:

1. Predrilled rectangular bars of annealed copper, 1/4 by 4 inch cross section, with 9/32-inch holes spaced 1-1/8 inch apart. Stand-off insulators for mounting must comply with UL 891 for use in switchboards, 600 V and must be Lexan or PVC, impulse tested at 5000 V.

2. Ground clamp on the main water pipe is to be listed for the application and compatible with the water pipe material, so as to prevent corrosion.

3. Conductor connecting bus bar to the main water pipe to be sized and installed as per electrical code.

4. Grounding conductors' conduits to be connected to the grounding bus as per electrical code.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Mechanical-Type Bus-Bar Connectors: Cast silicon bronze, solderless compression exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Compression-Type Bus-Bar Connectors: Copper or copper alloy, with two wire terminals.

E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

G. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

H. Conduit Hubs: Mechanical type, terminal with threaded hub.

I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with [hex head bolt] [socket set screw].

J. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

K. Lay-in Lug Connector: Mechanical type,

L. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

M. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.

N. Straps: Solid copper, cast-bronze clamp . Rated for 600 A.

O. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.

P. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

Q. Water Pipe Clamps:

1. Mechanical type, two pieces with zinc-plated bolts.
   a. Material: Die-cast zinc alloy.
   b. Listed for direct burial.
2. U-bolt type with malleable-iron clamp and copper ground connector.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel ; 3/4 inch by 10 ft. .

B. Ground Plates: 1/4 inch thick, hot-dip galvanized.

C. Underground metal water piping.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 30 inch below grade.

C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, telecom room, AV equipment room and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inch minimum from wall, 6 inch above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors must be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including dampers, humidifiers, etc. Bond conductor to each unit and to air duct.

C. Water Heater Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.5 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
2. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

F. Grounding of Cable Tray: Install insulated copper grounding conductors and ground each section of cable tray and connect to building grounding system.

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal , at ground test wells . Make tests at ground rods before any conductors are connected.
    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, the contractor is responsible to reduce ground resistance as recommended by national electric codes and notify Architect promptly.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

B. Provide supporting devices and accessories required for a complete system and its proper operation.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of hangers and supports.

1.3 INFORMATIONAL SUBMITTALS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified structural professional engineer to design hanger and support system.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Tube & Conduit; Atkore International.
   b. B-line; Eaton, Electrical Sector.
   c. CADDY; nVent.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel .
4. Channel Width: 1-5/8 inch .
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Galvanized steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1) Hilti, Inc.
   2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
   3) MKT Fastening, LLC.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Hilti, Inc.
      2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
      3) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.

6. Toggle Bolts: Stainless steel springhead type.

7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101
2. NECA NEIS 102.
3. NECA NEIS 105.
4. NECA NEIS 111.

B. Comply with requirements for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps .

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 INSTALLATION OF SUPPORTS

A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT may be supported by openings through structure members, in accordance with NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To New Concrete: Bolt to concrete inserts.
2. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inch thick.
3. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69 Spring-tension clamps.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Type EMT-SS raceways and elbows.
2. Type EMT-S raceways and elbows.
3. Type ENT raceways and fittings.
4. Type ERMC-SS raceways, elbows, couplings, and nipples.
5. Type ERMC-S raceways, elbows, couplings, and nipples.
6. Type FMC-S raceways.
7. Type IMC raceways.
8. Type LFMC raceways.
9. Type PVC raceways and fittings.
10. Fittings for conduit, tubing, and cable.
11. Threaded metal joint compound.
12. Solvent cements.
13. In Carpet Connectrac Powered Wireway-3.7” wide.
14. Stainless Steel Steelcase thread-floor infeeds-single/dual circuit and components
15. Metallic outlet boxes, device boxes, and covers.
16. Termination boxes.
17. Cabinets, cutout boxes, junction boxes, and pull boxes.
18. Cover plates for device boxes.
19. Hoods for outlet boxes.

B. Provide raceways, fittings, supporting devices, boxes and accessories required for a complete system and its proper operation.

C. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, floor furnitures, HVAC equipment, fire-suppression system, and partition assemblies.

D. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Wireways and auxiliary gutters.

2. In Carpet Connectrac Powered Wireway-3.7" wide.
3. Stainless Steel Steelcase thread-floor infeeds-single/dual circuit and components
4. Floor boxes/hubs.
5. Cabinets and cutout boxes.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details. Show that floor boxes are located to avoid interferences and are structurally allowable. Indicate floor thickness where boxes are embedded in concrete floors and underfloor clearances where boxes are installed in raised floors.

C. Samples: For wireways , surface raceways, and floor boxes for colors and textures specified.

PART 2 - PRODUCTS

2.1 TYPE EMT-SS RACEWAYS AND ELBOWS

A. Stainless Steel Electrical Metal Tubing (EMT-SS) and Elbows:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. Allied Tube & Conduit; Atkore International.
   b. Calconduit; Atkore International.
   c. Emerson Electric Co.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 797A and UL Category Control Number FJMX.
      2) Material: Stainless steel.
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
      2) Colors: As indicated on Drawings.

2.2 TYPE EMT-S RACEWAYS AND ELBOWS

A. Steel Electrical Metal Tubing (EMT-S) and Elbows:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. Allied Tube & Conduit; Atkore International.
   b. Calconduit; Atkore International.
   c. Emerson Electric Co.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 797 and UL Category Control Number FJMX.
      2) Material: Steel.
      3) Exterior Coating: Alternate corrosion-resistant coating.
      4) Interior Coating: Zinc .

c. Options:
1) Minimum Trade Size: 3/4 inch .
2) Colors: As indicated on Drawings.

2.3 TYPE ENT RACEWAYS AND FITTINGS

A. Electrical Nonmetallic Tubing (ENT) and Fittings (for use in underground installation outside of building footprint only):

1. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Cantex Inc.
c. JM Eagle; J-M Manufacturing Co., Inc.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 1653 and UL Category Control Number FKHU.
c. Options:
1) Minimum Trade Size: 3/4 inch .
d. Fittings:
1) Mechanically Attached Fittings: UL 1653.
2) Solvent-Attached Fittings: UL 651.

2.4 TYPE ERMC-SS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Stainless Steel Electrical Rigid Metal Conduit (ERMC-SS), Elbows, Couplings, and Nipples:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Allied Tube & Conduit; Atkore International.
c. Calconduit; Atkore International.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 6A and UL Category Control Number DYWV.
2) Material: Stainless steel.
c. Options:
1) Minimum Trade Size: 3/4 inch .
2) Colors: As indicated on Drawings.

2.5 TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:

1. Manufacturers: Subject to compliance with requirements, undefined:

a. Allied Tube & Conduit; Atkore International.
b. Calconduit; Atkore International.
c. Crouse-Hinds; Eaton, Electrical Sector.

2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 6 and UL Category Control Number DYIX.
      2) Exterior Coating: Zinc.
      3) Interior Coating: Zinc .
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
      2) Colors: As indicated on Drawings.

B. PVC-Coated-Steel Electrical Rigid Metal Conduit (ERMC-S-PVC), Elbows, Couplings, and Nipples:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Bluesteel Services LLC.
   c. Calbond; Atkore International.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 6 and UL Category Control Number DYIX.
      2) Exterior Coating: PVC complying with NEMA RN 1.
      3) Interior Coating: Zinc .
      4) Fittings for PVC-Coated Conduit:
         a) Minimum coating thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
         b) Conduit bodies must be Form 8 with an effective seal and a positive placement feature to ease and assure proper installation. Certified results confirming seal performance at 15 psig (positive) and 25 in. of mercury (vacuum) for 72 hours must be available. Conduit bodies must be supplied with plastic-encapsulated stainless steel cover screws.
         c) Form 2 inch long or one pipe diameter long, whichever is less, PVC sleeve at openings of female fittings, except unions. Inside sleeve diameter must be matched to outside diameter of metal conduit.
         d) PVC coating on the outside of conduit couplings must be protected from tool damage during installation.
         e) Female threads on fittings and couplings must be protected by urethane coating.
         f) Fittings must be from same manufacturer as conduit.
         g) Beam clamps and U bolts must be formed and sized to fit outside diameter of coated conduit. Plastic-encapsulated nuts must cover the exposed portions of threads.
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
      2) Colors: As indicated on Drawings.

3) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
4) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

2.6 TYPE FMC-S RACEWAYS

A. Steel Flexible Metal Conduit (FMC-S):

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Electri-Flex Company.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standard: UL 1 and UL Category Control Number DXUZ.
      2) Material: Steel.
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
      2) Colors: As indicated on Drawings.

2.7 TYPE IMC RACEWAYS

A. Steel Electrical Intermediate Metal Conduit (IMC):

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Allied Tube & Conduit; Atkore International.
   c. Calconduit; Atkore International.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standard: UL 1242 and UL Category Control Number DYBY.
      2) Exterior Coating: Alternative corrosion-resistant coating.
      3) Interior Coating: Zinc .
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
      2) Colors: As indicated on Drawings.

2.8 TYPE LFMC RACEWAYS

A. Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Anaconda Sealtite; Anamet Electrical, Inc.
   c. Electri-Flex Company.

2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standard: UL 360 and UL Category Control Number DXHR.
      2) Material: Steel.
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
3. Colors: As indicated on Drawings.

B. Stainless Steel Liquidtight Flexible Metal Conduit (LFMC-SS):

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. Electri-Flex Company.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standard: UL 360 and UL Category Control Number DXHR.
      2) Material: Stainless steel.
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
3. Colors: As indicated on Drawings.

2.9 TYPE PVC RACEWAYS AND FITTINGS (for use in underground installation outside of building footprint only):

A. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Calconduit; Atkore International.
   c. JM Eagle; J-M Manufacturing Co., Inc.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 651 and UL Category Control Number DZYR.
      2) Dimensional Specifications: Schedule 40.
   c. Options:
      1) Minimum Trade Size: 3/4 inch .
      2) Markings: For directional boring applications.

B. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Calconduit; Atkore International.
   c. JM Eagle; J-M Manufacturing Co., Inc.
2. Applicable Standards:

a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 651 and UL Category Control Number DZYR.
2) Dimensional Specifications: Schedule 80.
c. Options:
1) Minimum Trade Size: 3/4 inch .
2) Markings: For directional boring applications.

C. Type A Rigid PVC Concrete-Encased Conduit (PVC-A) and Fittings:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. Southern Pipe, Inc.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 651 and UL Category Control Number DZYR.
2) Dimensional Specifications: Type A.
c. Options:
1) Minimum Trade Size: 3/4 inch .

D. Type EB Rigid PVC Concrete-Encased Underground Conduit (PVC-EB) and Fittings:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. JM Eagle; J-M Manufacturing Co., Inc.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 651 and UL Category Control Number DZYR.
2) Dimensional Specifications: Type EB.
c. Options:
1) Minimum Trade Size: 4 inch .

2.10 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Fittings for Type ERMC, Type IMC, and Type PVC Raceways:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Crouse-Hinds; Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 514B and UL Category Control Number DWTT.
2) Material: Steel Die cast.
3) Coupling Method: Compression coupling .

c. Options:
1) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
2) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

B. Fittings for Type EMT Raceways:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Allied Tube & Conduit; Atkore International.
c. Calconduit; Atkore International.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 514B and UL Category Control Number FKAV.
2) Material: Steel Die cast.
3) Coupling Method: Compression coupling .
c. Options:
1) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
2) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

C. Fittings for Type LFMC Raceways:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. Liquid Tight Connector Co.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 514B and UL Category Control Number DXAS.

2.11 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT

A. Manufacturers: Subject to compliance with requirements, undefined:

1. ABB, Electrification Products Division.

B. Applicable Standards:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and approved by authorities having jurisdiction for application to threaded conduit assemblies.
2. General Characteristics:
a. Reference Standards: UL 2419 and UL Category Control Number FOIZ.

2.12 SOLVENT CEMENTS

A. Solvent Cements for Type PVC Raceways and Fittings:

1. Applicable Standards:
   a. General Characteristics:
      1) Reference Standards: As recommended by conduit manufacturer in accordance with UL 514B and UL Category Control Number DWTT.

2.13 METALLIC OUTLET BOXES, DEVICE BOXES, AND COVERS

A. Metallic Outlet Boxes:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Crouse-Hinds; Eaton, Electrical Sector.
   c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514A and UL Category Control Number QCIT.
   c. Options:
      1) Material: Sheet steel .
      2) Sheet Metal Depth: Minimum 2 inch .
      3) Cast-Metal Depth: Minimum 2.4 inch .
      4) Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb more than 50 lb and marked with maximum allowable weight.
      5) Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

B. Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
2. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Crouse-Hinds; Eaton, Electrical Sector.
   c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514A and UL Category Control Number QCIT.

C. Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Arlington Industries, Inc.
   c. Crouse-Hinds; Eaton, Electrical Sector.
3. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514A and UL Category Control Number QCIT.
   c. Options:
      1) Material: Sheet steel .
      2) Sheet Metal Depth: minimum 2 inch .
      3) Cast-Metal Depth: minimum 2.4 inch .
      4) Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing .
      5) Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

D. Metallic Floor Boxes and Floor Box Covers:

1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.
2. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. AFC Cable Systems; Atkore International.
   c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
3. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514A and UL Category Control Number QCIT.

2.14 TERMINATION BOXES

A. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.

B. Termination Boxes and Termination Bases for Installation on Line Side of Service Equipment:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. B-line; Eaton, Electrical Sector.
   c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

b. General Characteristics:
1) Reference Standards: UL 1773 and UL Category Control Number XCKT.
2) Listed and labeled for installation on line side of service equipment.

C. Termination Boxes and Termination Bases for Installation on Load Side of Service Equipment:

1. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. B-line; Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 1773 and UL Category Control Number XCKT.
2) Listed and labeled for installation on load side of service equipment.

2.15 CABINETS, CUTOUT BOXES, JUNCTION BOXES, AND PULL BOXES

A. Indoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Adalet.
c. B-line; Eaton, Electrical Sector.
3. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL Category Control Number CYIV.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 1

B. Indoor Sheet Metal Cutout Boxes:

1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Adalet.
c. B-line; Eaton, Electrical Sector.
d. Crouse-Hinds; Eaton, Electrical Sector.
3. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:

1) Reference Standards: UL Category Control Number CYIV.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 1

C. Indoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. Adalet.
b. B-line; Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL Category Control Number BGUZ.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 1.

D. Indoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. Adalet.
b. Crouse-Hinds; Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL Category Control Number BGUZ.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 1

E. Outdoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Adalet.
c. B-line; Eaton, Electrical Sector.
3. Applicable Standards:

a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL Category Control Number CYIV.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 3X Type 3R .

F. Outdoor Sheet Metal Cutout Boxes:

1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. ABB, Electrification Products Division.
b. Adalet.
c. B-line; Eaton, Electrical Sector.
3. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL Category Control Number CYIV.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 3X Type 3R .

G. Outdoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, undefined:
a. Adalet.
b. B-line; Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL Category Control Number BGUZ.
a) Non-Environmental Characteristics: UL 50.
b) Environmental Characteristics: UL 50E.
c. Options:
1) Degree of Protection: Type 3X Type 3R .

2.16 COVER PLATES FOR DEVICES BOXES

A. Nonmetallic Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, undefined:

a. ABB, Electrification Products Division.
b. Arlington Industries, Inc.
c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.

2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
      2) Wallplate-Securing Screws: Metal with head color to match wallplate finish.
   c. Options:
      1) Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
      2) Wallplate Material: 0.060 inch thick high-impact thermoplastic (nylon) with smooth finish and color matching wiring device .
      3) Color: White Office White As indicated on architectural Drawings.

2.17 HOODS FOR OUTLET BOXES

A. Retractable or Reattachable Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Raco Taymac Bell; Hubbell Incorporated, Commercial and Industrial.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
      2) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.
      3) Mounts to box using fasteners different from wiring device.
   c. Options:
      1) Provides white, weatherproof, "while-in-use" cover.

B. Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, undefined:
   a. ABB, Electrification Products Division.
   b. Allied Tube & Conduit; Atkore International.
   c. Arlington Industries, Inc.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
      2) Marked "Extra-Duty" in accordance with UL 514D.

3) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.
4) Mounts to box using fasteners different from wiring device.

c. Options:
1) Provides white, weatherproof, "while-in-use" cover.
2) Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 SELECTION OF RACEWAYS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.

B. Outdoors:

1. Exposed Conduit: ERMC .
2. Concealed Conduit, Aboveground: ERMC .
3. Direct-Buried Conduit: PVC-40.
4. Concrete-Encased Conduit in Trench: PVC-40 .
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

C. Indoors:

1. Exposed and Subject to Physical Damage: ERMC . Raceway locations include the following:

a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
b. Mechanical rooms.
c. Fire Pump Room

2. Concealed in Ceilings and Interior Walls and Partitions: IMC EMT.
3. Damp or Wet Locations: IMC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC .

D. Stub-ups to Above Recessed Ceilings: Provide EMT, IMC, or ERMC for raceways.

E. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

3.2 SELECTION OF BOXES AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:
   a. Type 3R Type 3 unless otherwise indicated.
   b. Locations Exposed to Hosedown: Type 6 .
   c. Locations Subject to Potential Flooding: Type 6P.
   d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
   e. Locations in-Ground or Exposed to Corrosive Agents: Type 4X .
   f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.
2. Indoors:
   a. Type 1 unless otherwise indicated.
   b. Damp or Dusty Locations: Type 12 .
   c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
   d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12 .
   e. Locations Exposed to Airborne Dust, Lint, Fibers, or Flyings: Type 6.
   f. Locations Exposed to Hosedown: Type 6 .
   g. Locations Exposed to Brief Submersion: Type 6P.
   h. Locations Exposed to Prolonged Submersion: Type 6P.
   i. Locations Exposed to Corrosive Agents: Type 4X .
   j. Locations Exposed to Spraying Oil or Coolants: Type 13.

C. Exposed Boxes Installed Less Than 6.5 ft. Above Floor:

1. Provide cast-metal boxes. Boxes with knockouts or unprotected openings are prohibited.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF RACEWAYS

A. Installation Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
3. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
4. Comply with NECA NEIS 101 for installation of steel raceways.

5. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
6. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4 inch trade size and insulated throat metal bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
7. Raceway Terminations at Locations Subject to Moisture or Vibration:

B. General Requirements for Installation of Raceways:

1. Complete raceway installation before starting conductor installation.
2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft. above finished floor.
3. Install no more than equivalent of three 90-degree bends in conduit run except for control wiring conduits, for which no more than equivalent of two 90-degree fewer bends are permitted. Support within 12 inch of changes in direction.
4. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
5. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
6. Support conduit within 12 inch of enclosures to which attached.
7. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
8. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:
    a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    b. Where an underground service raceway enters a building or structure.
    c. Conduit extending from interior to exterior of building.
    d. Where otherwise required by NFPA 70.
9. Keep raceways at least 6 inch away from parallel runs of flues and hot-water pipes. Install horizontal raceway runs above water and steam piping.
10. Cut conduit perpendicular to the length. For conduits 2 inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
11. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

C. Requirements for Installation of Specific Raceway Types:

1. Types ERMC and IMC:
    a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to

threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

2. Types FMC and LFMC:
   a. Comply with NEMA RV 3. Provide a maximum of 72 inch of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
3. Type PVC:
   a. Do not install Type PVC conduit where ambient temperature exceeds 75 Degree F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted. PVC can only be used for underground installation outside of the building footprint.
   b. Comply with manufacturer's written instructions for solvent welding and fittings.

D. Stub-ups to Above Recessed Ceilings:

1. Provide EMT, IMC, or ERMC for raceways.
2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

E. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
2. EMT: Provide compression , fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

F. Expansion-Joint Fittings:

1. Install in runs of aboveground ERMC conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft..
2. Install type and quantity of fittings that accommodate temperature change listed for the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
   d. Attics: 135 deg F temperature change.
   e. .
3. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at locations where conduits cross building or structure expansion joints.
5. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

G. Raceways Penetrating Rooms or Walls with Acoustical Requirements:

1. Seal raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.

3.4 INSTALLATION OF SURFACE RACEWAYS

A. Install surface raceways only where indicated on Drawings.

B. Install surface raceway with a minimum 2 inch radius control at bend points.

C. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inch and with no less than two supports per straight raceway section. Support surface raceway in accordance with manufacturer's written instructions. Tape and glue are unacceptable support methods.

3.5 INSTALLATION OF BOXES AND ENCLOSURES

A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.

B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

C. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.

D. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

E. Locate boxes so that cover or plate will not span different building finishes.

F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.

G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.

H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.

I. Set metal floor boxes level and flush with finished floor surface.

J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.

L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:

1. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
2. Provide gaskets for wallplates and covers.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.8 CLEANING

A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeve seal systems.
2. Grout.
3. Foam sealants.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVE SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. BWM Company.
3. CALPICO, Inc.

B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable or between raceway and cable.

1. Sealing Elements: Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.2 GROUT

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. W.R. Meadows, Inc.

B. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Design Mix: 5000 psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.3 FOAM SEALANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dow Chemical Company (The).
2. Innovative Chemical Products (Building Solutions Group).

B. Description: Multicomponent, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam. Foam expansion must not damage cables or crack penetrated structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
   a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
   b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4 inch annular clear space between sleeve and raceway or cable, unless sleeve seal system is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for wall assemblies.

C. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seal systems. Size sleeves to allow for 1 inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

E. Underground, Exterior-Wall and Floor Penetrations:

1. Install steel pipe sleeves with integral waterstops. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Install sleeve during construction of floor or wall.
2. Install steel pipe sleeves. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Grout sleeve into wall or floor opening.

3.2 INSTALLATION OF SLEEVE SEAL SYSTEMS

A. Install sleeve seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Tags.
4. Signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 degree F.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field .
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Grounded/Neutral: White
3. Colors for 480/277-V Circuits:
   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Grounded/Neutral: Gray
4. Color for Equipment Grounds: Green or Green with a yellow stripe.
5. Colors for Isolated Grounds: Green two or more yellow stripes.

C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

D. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
3. As per NEC 2017. .

E. Equipment Identification Labels:

1. Black letters on a white field.
2. As per NEC 2017.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Brady Corporation.
   b. Champion America.
   c. emedco.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameter and that stay in place by gripping action.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Brady Corporation.
   b. HellermannTyton.
   c. Marking Services, Inc.

C. Self-Adhesive Wraparound Labels: , 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. A'n D Cable Products.
   b. Brady Corporation.
   c. Brother International Corporation.
2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.4 TAGS

A. Write-on Tags:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Brimar Industries, Inc.
   b. Carlton Industries, LP.
   c. LEM Products Inc.
2. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.
3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 SIGNS

A. Baked-Enamel Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Champion America.
c. emedco.

2. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 7 by 10 inches.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer load shedding .

L. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

M. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

N. Vinyl Wraparound Labels:

1. Secure tight to surface at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

O. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

P. Self-Adhesive Wraparound Labels: Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

Q. Self-Adhesive Labels:

1. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.

R. Write-on Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using cable ties.

S. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.

3.2 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels .

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels self-adhesive wraparound labels snap-around labels to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

E. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive equipment labels Baked-enamel warning signs .

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
   a. Power-transfer switches.
   b. Controls with external control power connections.
   c. .

G. Arc Flash Warning Labeling: Self-adhesive labels.

H. Operating Instruction Signs: Self-adhesive labels Baked-enamel warning signs .

I. Emergency Operating Instruction Signs: Self-adhesive labels Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer load shedding Emergency Generator .

J. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
2. Outdoor Equipment: Laminated acrylic or melamine sign .

END OF SECTION 260553

SECTION 26 09 23 LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. In centering outlets allow for overhead pipes, ducts, etc., and for variation in thickness of fireproofing and plastering. Allowances shall also be made for window trims, paneling, counters, casework, etc. Any inaccuracies resulting from failure to comply with the above must be corrected without additional expense to the Owner.

C. Provide a relay based lighting controls consisting of relay or contactor control panel(s), control switches, program controller, time clock and other controlling devices for automatic control of lighting in common areas, corridors, stairs, and all other mechanical spaces as shown in contract drawings. Provide a separate lighting control system with programmable controller, time clock and photocell with day light saving and a full year of scheduling capabilities for emergency lighting. Refer to specifications section “260943 - RELAY-BASED LIGHTING CONTROLS” for relay-based lighting control system.

D. Provide a separate lighting control system for individual space lighting control as shown in contract drawings. All other interior spaces such as large office, individual offices, conference rooms, and all other instructional spaces shall be provided with 4 button dimming switch (Manual on, raise, lower and off button) along with vacancy sensors. Rooms with window or skylights shall be provided with daylight harvesting system. Gang toilets AV storage rooms, and all other small spaces shall be provided with line voltage occupancy and vacancy sensors switch. All required room controllers, power packs shall be provided for complete installation and proper operation of the system as required by NYS 2020 Energy Code. Refer to contract drawings for the requirement of individual space lighting control system.

1.2 DESCRIPTION OF WORK

A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all wiring devices in accordance with Drawings and Specifications.

B. The general operation of lighting and controlled loads shall include:

1. Interior lighting: Each room shall have at least one accessible lighting control to independently activate general lighting within the room. Rooms not intended for 24-hour continuous use shall be provided with automatic controls capable of limiting the hours of lighting use to the occupancy hours of the room.

2. Occupant sensors are such that the lights are turned manually “ON” (except where specifically indicated to be automatic on) and keeps them “ON” whenever occupancy is detected and shall turn them ‘OFF’ after the “delayed-off time” has expired. Sensors are to be programed to automatically turn off the lights within 15 minutes of all occupants leaving the space. For manual on sensors (vacancy sensors), the sensor shall have a grace period of up to 30 seconds to turn on the lighting automatically after the sensor has turned off the lighting if occupancy is detected. The sensor shall continually analyze and adjust changing conditions.

3. Daylight Harvesting system shall be installed to maintain lighting level at required foot-candle in rooms and offices with windows and skylight utilizing a closed-loop system.

1.3 QUALITY ASSURANCE

A. "Manufacturers" - Firms regularly engaged in manufacture of wiring devices and installation components, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Provide wiring devices and installation components produced by a manufacturer listed as Manufacturer in this Section.

C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

D. Coordinate with lighting fixtures vendor for the LED driver to confirm the suitability of the proposed lighting control system and its operation.

1.4 SUBMITTALS

A. Submittals Package: Submit the shop drawings and product data submittals specified below at the same time as a package.

B. Shop Drawings:

1. Bill of materials.

C. Product Data:

1. Catalog sheets, specifications and installation instructions for each wiring device, manual switches.

2. Name, address and telephone number of nearest certified manufacturer's representative.

3. Lighting Channel Schedule. Indicate which lighting circuit is operated by which relay and control device.

4. Warranty

5. Provide samples of each product for final selection by the project Architect.

6. Final finish selection is by the project architect.

D. Contract Close-out Submittals:

1. Test Report: System acceptance test report, field test report.

2. Certificate: Affidavit, signed by the Contractor, certifying that the system meets the contract requirements and is operating properly.

3. Operation and Maintenance Data:
   a. Deliver 6 copies, covering the installed products, to the Owner's Representative. Include:

      1) Operation and maintenance data for each product.

4. Lighting Control Panel Schedules.

1.5 WARRANTY

A. Manufacturer shall provide a one-year warranty for all system components.

PART 2 - PRODUCTS

2.1 SWITCHES

Commercial specification grade, UL listed; compliance with UL 20 and NEMA standard WD-1, “General Purpose Wiring Devices”.

A. Toggle Single Pole:

1. 20A, 120/277 VAC;
   CS120 from Hubbell Inc.; CS120-2 from Leviton Mfg.;

B. Three-way Toggle:

1. 20A, 120/277 VAC;
   CS320 from Hubbell Inc.; CS320-2 from Leviton Mfg.;

C. Locking type (Key-Operated) Single-pole
Industrial specification grade for this device.

1. 15A, 120/277V AC;
   HBL 1201-L from Hubbell Inc.; 1101-2L from Leviton Mfg.;

2. 20A, 120/277 VAC;
   HBL 1221-L from Hubbell Inc.; CS1121-2L from
   Leviton Mfg.;

D. Low Voltage dimming/occupancy/vacancy sensors and switches:

1. Low voltage switches for occupant sensors, vacancy mode (Manual 'On', Automatic Off), -equivalent model from Lutron .

2. For line voltage wall-mounted occupant sensors (Vacancy Mode/Manual ON) in small offices, Lutron # MS-A102-V-WH or approved equal.

3. For line-voltage occupant Sensor in occupancy Mode/Auto ON) wall-mounted sensors, Lutron # MS-Z102-V-WH or approved equal.

4. 2 button wall station with raise/lower; Lutron- QSWS2-2BRLN-WH

5. 5 button wall station with raise/lower; Lutron- QSWS2-5BRLN-WH

6. Scene control station from Lutron; master scene recall station with presets 1-5 and physical faders or raise/lower for each also includes preset record and entry station lockout.

7. Entry station from Lutron; preset recall button station. Preset 1=all lights on. Preset 2= room vacant. Lock out available from scene control station.

8. 3-way switch; Lutron CA-3PS-WH

9. Sing pole dimmer switch; Lutron CA-1PS-WH

10. Multi-button Switch (For use with daylight Harvesting): Wall-mounted Four-button switch with Off/50%/On w/Raise/Lower. The switch shall be Lutron PX-3BRL-GXX*-I01 or approved equal.

E. Multi-Scene wired control: Provide Lutron networked lighting control with control stations and controllers with configuration as indicated in drawings.

2.2 OCCUPANT SENSORS

A. Occupant Sensors – Manual On: Occupant sensors shall operate in the vacancy mode with "manual ON" and shall be of dual technology passive infrared and ultrasonic/ microphonics type to control all fixtures within the space. Low voltage units shall be provided with power packs. Both the occupant sensor and the power pack shall be the product of a single manufacturer. Line-voltage sensors do not require power packs.

1. For ceiling-mounted sensors, the sensor shall be able cover an area up to 2000 SQ Ft.

    a. Lutron LOS-CDT-2000

2. For high-bay ceilings up to 40 feet (Such as Lecture Halls), the sensors shall be

    a. Lutron WSPM24V-180-CN6111

B. Occupant Sensors – Auto On: Where specifically indicated on the drawings, such as storerooms, provide occupant sensors in occupancy mode (Auto On). Sensors shall be passive infrared type to control all fixtures within the space.

    1. For line-voltage occupant Sensor in occupancy Mode/Auto ON) wall-mounted sensors, Lutron # MS-Z102-V-WH or approved equal.

C. Occupant Sensors – Luminaire-mounted: Where indicated on Drawings, such as stairways, corridors, student locker rooms, and multi-occupant student toilets. Sensors to be auto on and dim luminaires to 50% in the off position.

2.3 DAYLIGHT HARVESTING SYSTEM

A. System description

The system shall be installed in offices and all other instructional space with windows and shall consist of:

1. Daylight Harvesting Sensors: Sensor shall be of closed type system and shall control both rows of lights to produce the desired foot-candle at the appropriate surface (desk level). The sensor shall be Lutron EC-DIR.

2. Room controllers: The daylight harvesting sensor must be connected to the appropriate controller from the same manufacturer. Controller shall be Lutron QSN-4T16.

3. Multi-button Dimmer Switch (For use with daylight Harvesting): Wall-mounted Four-button switch with Off/50%/On w/Raise/Lower. The switch shall be Lutron PX-3BRL-GXX*-I01 or approved equal.

2.4 LIGHTING CONTROL SYSTEM

A. Each lighting circuit shall be individually controlled by the Lighting and receptacle Control Panels as per panel schedule. Relays and contactors in the Lighting Control Panel shall be mechanically held, UL listed for 277 volt, rated for minimum 20 amp tungsten and magnetic or electronic ballast loads. Lighting Control Panel shall be UL listed, FCC approved for commercial use. Provide 20% spare relays/contactor poles in each panel.

B. Lighting and Receptacle Control Panels shall have internal timeclock-based scheduling for automatically controlling interior lighting and receptacles. Each relay/contactor shall be individually configurable to meet project needs. Each relay/contactor shall include an LED light status indicator to provide channel status and a separate ON/OFF/Auto switch for manual control.

C. Lighting Control Panels shall have connections to network multiple panels into a complete centrally operable system, and low voltage connections for control by external photocells, occupancy sensors, switches, timers, etc. Refer to specification sections 260943 “RELAY-BASED LIGHTING CONTROLS” for complete specification of this item.

2.5 LIGHTING CONTROL SYSTEM CLOCK

A. The system clock shall provide time-based control with eight year time back-up, non-volatile memory program storage, automatic daylight savings adjustment, selectable 12/24 hour time formats and selectable date formats. All clock and system configuration programming shall be accessible from the clock front display/keypad.

B. Features

1. Control of lighting circuits shall be available on the Lighting Control Panel clock/display. Provide status and manual ON/OFF control of each channel from the front display and keypad.
2. The clock shall have control inputs, which can be used to connect external devices such as photocells, sensors and switches. Each of these inputs can be configured to operate as a photocell, or occupant sensor (typically a “vacancy” sensor), an ON/Auto switch, as a maintained ON/OFF switch, or as a momentary ON/OFF switch.

3. Following a power outage, the system clock shall run a start-up process that executes schedules that would have been missed during the power outage.

2.6 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG + Gnd.

B. Classes 2 and 3 Control Cable (0-10V): Multiconductor cable with stranded copper conductors not smaller than No. 18 unless otherwise indicated.

C. Class 1 Control Cable: Multiconductor cable with stranded copper conductors not smaller than No. 16 AWG.

D. Install unshielded, twisted-pair cable for control and signal transmission conductors.

E. Belden cable 1387LA or equivalent.

F. Lutron sensor cable C-CBL-522S or use 4 # 22 AWG

G. Ethernet cable- Cat 6

H. Fiber Optic cable

I. All cables in plenum environment shall be plenum rated cable.

J. DMX cable. Use Lutron
GRX-CBL-DMX-250/GRX-CBL-DMX-500 OR
BELDEN #9729 (NON-PLENUM) OR BELDEN
#89729 (PLENUM) OR DURA FLEX 2214 WA Cable.

2.7 WALL PLATES

A. Stainless Steel Wall Plates: Type 302 stainless steel with satin finish; Bryant's, CrouseHinds/AH's, General Electric's, Hubbell's, or Pass & Seymour's.

B. Weatherproof Covers: Crouse-Hinds WLRS, WLRD, Hubbell's, or Pass & Seymour's. Provide enclosure and cover (suitable for outdoor use) for all outdoor receptacles. Enclosures, and cover shall be weatherproof whether or not the attachment plug is inserted.

C. Covers for Threaded Type Boxes: Stamped sheet steel, gasketed device covers as produced by Crouse-Hinds Co., or OZ/Gedney Co.

D. Stainless Steel Blank Plates: Provide blank plates to cover the existing back boxes after removal of exiting receptacle outlets and switches.

E. Non-Metallic wall plates (Final finish and color shall be as approval by Architect at site):

a. Lecture halls front wall – lecturer wall with whiteboard/blackboard. Finish: White
b Lecture halls back wall – custom color acoustic tectum. Finish: White
c FOH Corridors – Wainscot/chair rail outlets. Finish: As approved by architect
d FOH Atrium – Stair w/ adjacent built-in benches. Finish: As approved by architect
e. 2nd floor Huddle areas. Finish: White

2.8 NAMEPLATES

A. Phenolic Type: Standard phenolic nameplates with 3/16-inch minimum size lettering engraved thereon.

B. Embossed Aluminum: Standard stamped or embossed aluminum tags, 3/16-inch minimum size lettering, as produced by Seton Name Plate Corp. or Tech Products Inc.

1. Sections shall be provided in accordance with installation requirements.

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor shall examine location where wiring devices and installation components are to be installed, determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.

B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wiring devices and installation components where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that installation complies with requirements and serves intended purposes.

B. Coordinate with other work as necessary to interface installation of wiring devices and installation components.

C. Installation shall comply with the requirements of NEC and NECA, "Standard of Installation".

D. Install devices only after wiring is completed.

E. Install receptacles and switches only in electrical outlet boxes which are clean, free from debris, excess building materials, etc.

F. At time of completion, replace items which have been damaged, including those burned and scorched by faulty plugs.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of wiring devices and installation components, and after connection to power source, test wiring devices and installation components to demonstrate compliance with requirements. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

B. Test wiring devices and installation components to ensure electrical continuity of grounding connections.

3.4 TRAINING

Manufacturer for the lighting control system shall provide factory authorized application engineer to provide 4-hours session training to School personnel in the operation and programming of the lighting control system.

3.5 COMMISSIONING OF LIGHTING CONTROL DEVICES AND SYSTEMS.

A. Single prime contract shall comply with the Commissioning Requirements for all lighting control devices.

B. All testing of lighting control devices shall be completed prior to commencement of the commissioning process.

C. Upon completion of the installation, the system shall be completely tested and commissioned by the manufacturer's factory authorized technician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control system and provide operation in accordance with the sequence of operation. Provide complete test reports certifying the proper operation of occupancy/vacancy sensor systems in all spaces where they are installed.

D. The single prime contract or a technician familiar with the installed system shall demonstrate the lighting system functional test to the Commissioning Authority (CxA). Prior to functional testing, the Contractor shall provide written confirmation that the system is ready for functional testing verification and that all lighting controls have been programmed in accordance to contract requirements. The lighting system functional test will consist of and comply with all sections and subsections of Section C408.3 of the 2020 NYC Energy Conservation Code.

PART 4 - Manufacturers

4.1 WIRING DEVICES

A. Harvey Hubbell Incorporated.
B. Leviton
C. Douglas Lighting Control.
D. Hubbell Lighting Inc.
E. Acuity Brands
F. Watt Stopper
G. Lutron

4.2 LOW VOLTAGE SYSTEM WIRING DEVICES (PART OF LOW VOLTAGE LIGHTING CONTROL SYSTEM)

A. Lutron
B. Leviton
C. Douglas Lighting Controls/Watt Stopper
D. Or approved equal

4.3 MISCELLANEOUS INSTALLATION COMPONENTS

A. Refer to Respective Articles.

END OF SECTION 26 09 23

SECTION 260943 - RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lighting and receptacle control relay panels with program controller, time clock and photocell.
2. Manual switches and cover plates.
3. Conductors and cables.
4. A separate lighting control with time clock and photocell for exterior emergency lighting.

B. Provide a relay based lighting and receptacle controls consisting of relay or contactor control panel(s), control switches, program controller, time clock and other controlling devices for automatic control of lighting in common areas, corridors, stairs, and all other spaces as shown in contract drawings. Provide a separate lighting control system with programmable controller, time clock and photocell with day light saving and a full year of scheduling capabilities for exterior emergency lighting.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Shop Drawings: For each relay panel and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than Type 1.
3. Detail wiring partition configuration, current, and voltage ratings.
4. Short-circuit current rating of relays.
5. Address Drawing: Reflected ceiling plan and floor plans, showing connected luminaires, address for each luminaire, and luminaire groups. Base plans on construction plans, using the same legend, symbols, and schedules.
6. Point List and Data Bus Load: Summary list of all control devices, sensors, ballasts, and other loads. Include percentage of rated connected load and device addresses.

7. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
8. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
9. Submit evidence that lighting controls are compatible with connection to fire alarm system

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lighting Control Relays: Equal to 10 percent of amount installed for each size indicated, but no fewer than 12 .

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation in accordance with NECA 407.

1.6 WARRANTY

A. Special Manufacturer Extended Warranty: Manufacturer warrants that components of standalone multipreset modular dimming controls perform in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within extended warranty period.

1. Initial Extended Warranty Period: Two year(s) from date of Substantial Completion, for labor, materials, and equipment.
2. Follow-on Extended Warranty Period: 1 year(s) from date of Substantial Completion, for materials that failed because of transient voltage surges only, f.o.b. the nearest shipping point to Project site.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Sequence of Operations: Input signal from field-mounted manual switches, or digital signal sources, must open or close one or more lighting control relays in the lighting control panels. Any combination of inputs must be programmable to any number of control relays.

B. Surge Protective Device: Factory installed as an integral part of control components or field-mounted surge suppressors complying with UL 1449, SPD Type 2.

C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70 by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

D. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.

E. Comply with UL 916.

2.2 LIGHTING CONTROL RELAY PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Lutron
2. Leviton
3. Douglas Lightning Controls/Watt Stopper
4. Or approved equal

B. Description: Standalone lighting and receptacle control panel using mechanically latched relays to control lighting and appliances.

C. Lighting and receptacle Control Panel:

1. A single enclosure with incoming lighting/receptacle branch circuits, control circuits, switching relays, and on-board timing and control unit.
2. A vertical barrier separating branch circuits from control wiring.

D. Control Unit: Contain the power supply and electronic control for operating and monitoring individual relays.

1. Timing Unit:
   a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
   b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
   c. 12 independent schedules, each having 24 time periods.
   d. Schedule periods settable to the minute.
   e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
   f. 24 special date periods.
2. Sequencing Control with Override:

a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.

3. Nonvolatile memory must retain all setup configurations. After a power failure, the controller must automatically reboot and return to normal system operation, including accurate time of day and date.

E. Relays:

1. Electrically operated, mechanically held single-pole switch, rated at 20 A at 277 V. Short-circuit current rating must be not less than 15 kA. Control must be three-wire, 24 V(ac).

F. Power Supply: NFPA 70, Class 2, sized for connected equipment, plus 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, control-voltage inputs, field-installed occupancy sensors, and photo sensors.

G. Operator Interface:

1. Integral alphanumeric keypad and digital display, and intuitive drop-down menus to assist in programming.
2. Log and display relay on-time.
3. Connect relays to one or more time and sequencing schemes.

H. Lighting Control Panels shall have connections to network multiple panels into a complete centrally operable system, and low voltage connections for control by external photocells, occupancy sensors, switches, timers, etc

2.3 MANUAL SWITCHES AND COVER PLATES

A. Push-Button Switches: Modular, momentary contact, three wire, for operating one or more relays and to override automatic controls.

1. Match color and style specified in Section 262726 "Wiring Devices."
2. Integral green LED pilot light to indicate when circuit is on.
3. Internal white LED locator light to illuminate when circuit is off.

B. Cover Plates: Single and multigang cover plates as specified in Section 262726 "Wiring Devices."

C. Legend: Engraved or permanently silk-screened on cover plate where indicated. Use designations indicated on Drawings.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG.

B. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG.

C. Twisted-Pair Data Cable: Category 6 .

1. Comply with requirements for twisted pair cabling in Section 260523 "Control-Voltage Electrical Power Cables."

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING

A. Wiring Methods:

1. Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters.
2. Install cables in raceways and cable trays except within consoles, cabinets, desks, counters, accessible ceiling spaces, and gypsum board partitions where unenclosed wiring method may be used.
3. Conceal raceway and cables except in unfinished spaces.
4. Provide plenum-rated cable, where installed exposed or in open cable tray, within environmental airspaces, including plenum ceilings.
5. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.2 INSTALLATION OF PANELS

A. Install panels and accessories in accordance with NECA 407.

B. Mount top of trim 78 inch above finished floor unless otherwise indicated.

C. Mount panel cabinet plumb and rigid without distortion of box.

D. Install filler plates in unused spaces.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Field tests must be witnessed by Architect .

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers described below and low-voltage surge arrestors. Certify compliance with manufacturer's test parameters.
   a. Circuit-Breaker Tests:
      1) Compare nameplate with Drawings and Specifications.
      2) Inspect physical and mechanical conditions.
      3) Inspect anchorage and alignment.
      4) Verify that the units are clean.
      5) Operate the circuit breaker to ensure smooth operation.
      6) Inspect bolted electrical connections for high resistance using one or more of the following methods:
         a) A low-resistance ohmmeter.
         b) Verify tightness of bolted electrical connections by calibrated torque wrench.
         c) Thermographic survey.
      7) Inspect operating mechanism, contacts, and arc chutes in unsealed units.
      8) Perform insulation resistance tests for one minute on each pole, phase-to-phase, and phase-to-ground with the circuit breaker closed and across each pole using manufacturer's published data.
      9) Perform a contact/pole-resistance test.
      10) Perform insulation-resistance tests on control wiring with respect to ground. Applied potential must be 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable. Test duration must be for one minute. Follow manufacturer's instructions for solid-state units.
      11) Determine long-time pickup and delay by primary current injection.
      12) Determine short-time pickup and delay by primary current injection.
      13) Determine ground-fault pickup and time delay by primary current injection.
      14) Determine instantaneous pickup by primary current injection.
      15) Test functions of the trip unit by means of secondary injection.
      16) Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data.
      17) Verify correct operation of auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, anti-pump function, and trip unit battery condition. Reset trip logs and indicators.
      18) Verify operation of charging mechanism.

C. Nonconforming Work:

1. Lighting control panel will be considered defective if it does not pass tests and inspections.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

E. Manufacturer Services:

1. Engage factory-authorized service representative to supervise field tests, inspections and commissioning of the entire lighting control system.

3.5 SYSTEM STARTUP

A. Engage a factory-authorized service representative to perform startup service.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 260943

SECTION 262213 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes distribution, ventilated, dry-type cast coil transformers with a nominal primary and secondary rating of 600 V and less, with capacities up to 115 kVA.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

1. Field quality-control reports.
2. Field Test Reports

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace transformer that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. ABB

2.2 PERFORMANCE REQUIREMENTS

A. Applicable Standards

1. UL-1561 - Transformers
2. ANSI C57.12.00 - Transformers
3. NEMA 250 - Transformers.
4. IEEE C2

2.3 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled dry-type cast coil units for 60-Hz service.

B. Comply with NFPA 70.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

C. Transformers Rated 15 kVA and Larger:

1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
2. Marked as compliant with DOE 2016 efficiency levels by an NRTL.

D. Encapsulation: Transformers smaller than 115 kVA shall have core and coils completely resin encapsulated.

E. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.

F. Coils: Continuous windings except for taps.

1. Coil Material: Copper.
2. Internal Coil Connections: Brazed or pressure type.
3. Terminal Connections: Bolted.

G. Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

2.4 DISTRIBUTION TRANSFORMERS

A. Comply with NFPA 70 , and list and label as complying with UL 1561.

B. Comply with efficiency requirements of Table 8.4.4 of ASHRAE 90.1-2016.

C. Cores: One leg per phase.

D. Enclosure: Ventilated .

1. NEMA 250, Type 2 : Core and coil shall be encapsulated within epoxy resin compound to seal out moisture and air.
2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
3. Wiring Compartment: Sized for conduit entry and wiring installation.

E. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

F. Insulation Class, 20 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 80 deg C rise above 40 deg C ambient temperature.

G. Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.

H. Wall Brackets: Manufacturer's standard brackets .

I. K-Factor Rating: Transformers serving computer panels to be K-factor rated and shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.

1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
2. Indicate value of K-factor on transformer nameplate.

J. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

TRANSFORMER RATING, KVA	AVERAGE SOUND LEVEL, DB
0-9	40
10-50	45
51-150	50
151-300	55
301-500	60

2.5 IDENTIFICATION

A. Nameplates: Engraved, laminated-acrylic or melamine plastic signs for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

B. Nameplates: Self-adhesive label for each distribution transformer. Self-adhesive labels are specified in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

E. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.

3.2 INSTALLATION

A. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer .

1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.

B. Install transformers level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.

C. Construct concrete bases according to Section 033000 "Cast-in-Place Concrete" and anchor floor-mounted transformers according to manufacturer's written instructions and requirements in Section 260529 "Hangers and Supports for Electrical Systems."

1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

D. Secure transformer to concrete base according to manufacturer's written instructions.

E. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.

F. Remove shipping bolts, blocking, and wedges.

3.3 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Small (Up to 125-kVA Three-Phase) Dry-Type Transformer Field Tests:

1. Visual and Mechanical Inspection.
    a. Inspect physical and mechanical condition.
    b. Inspect anchorage, alignment, and grounding.
    c. Verify that resilient mounts are free and that any shipping brackets have been removed.
    d. Verify the unit is clean.
    e. Perform specific inspections and mechanical tests recommended by manufacturer.
    f. Verify that as-left tap connections are as specified.
    g. Verify the presence of surge arresters and that their ratings are as specified.
2. Electrical Tests:
    a. Measure resistance at each winding, tap, and bolted connection.
    b. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index: the value of the index shall not be less than 1.0.
    c. Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.
    d. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

C. Remove and replace units that do not pass tests or inspections and retest as specified above.

D. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 262213

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards (Power Panel board).
2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Key interlock scheme drawing and sequence of operations.
10. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards/distribution boards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

D. RATINGS
1. Panelboards rated 240 Vac or less shall have short-circuit ratings as shown on the drawings, but not less than 22,000-amperes RMS symmetrical.
2. Panelboards rated 480 Vac shall have short-circuit ratings as shown on the drawings, but not less than 22,000-amperes RMS symmetrical.
3. Distribution Panelboards rated 480 Vac shall have short-circuit ratings as shown on the drawings, but not less than 65,000-amperes RMS symmetrical.
4. Panelboards shall be labeled with a UL short-circuit rating. U.L. Series rating is not permitted.

E. Enclosures: Floor, Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.
   a. Indoor Dry and Clean Locations: NEMA 250, Type 1 .
   b. Other Wet or Damp Indoor Locations: NEMA 250, Type 4 .
   c. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.
2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

F. Incoming Mains Location: Top .

G. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Compression type, with a lug on the neutral bar for each pole in the panelboard.
3. Ground Lugs and Bus-Configured Terminators: Compression type, with a lug on the bar for each pole in the panelboard.
4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

I. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

J. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

K. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

L. Provide ground fault trip devices and relays as required by code.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.3 DISTRIBUTION PANELBOARDS/POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.

B. Distribution Panelboards: NEMA PB 1, distribution type, Floor mounted.

C. Enclosure: Steel: NEMA type. Cabinet shall consist of a rigidly constructed enclosure not less than # 14 gauge, cold rolled, steel for sections up to 900 square inches in area, and # 12 gauge for larger panel areas Gutter space shall be adequate for the conductors to be installed. Side

gutters shall be not less than 4" for 100-ampere units, 6" for 200-ampere units and 8" for 400-600 ampere units. Top and bottom gutter space shall be not less than 12". Front trim of cabinet shall be designed so that gutter spaces will be accessible through hinged sections. No. 14-gauge steel angles or channels shall be provided to adequately support distribution equipment from floor with necessary bracing. Enclosure Finish: Factory-applied electro-static powder coating in manufacturer's standard gray finish

D. Mains: Main Lugs.

E. Feeder Overcurrent Protective Devices (MCCBs-Adjustable trip settings) for Circuit-Breaker Frame Sizes 400 A and Smaller: Bolt-on circuit breakers. Group and panel mounted.

F. Pull Box **or Crown Box** on Top of Switchboard/Distribution Board: Include the following features:

1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.

2. Insulated supports for all conductors shall be arranged to facilitate cabling.

3. Pull box shall be #12-gauge sheet steel, and finished in a manner similar to Distribution Board.

G. Buses and Connections: Three-phase, four-wire. Include the following features:

1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity with feeder circuit-breaker line connections.

2. Ground Bus: 1/4” by 2” (6-by-50-mm) minimum size, drawn-temper copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3. Contact Surfaces of Buses: Silver-plated.

4. Main Phase Buses, Neutral Buses, and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.

5. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.

6. Neutral Buses: 100 percent of the ampacity of the phase buses, unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables. Bus extensions for busway feeder neutral bus is braced.

7. All live parts shall be a minimum clearance of 12” above the finished floor.

8. Electric metering of branch circuits/Feeder circuits (Feeding HVAC equipment) shall be SATEC BFM136-60Hz-ETH-SO-FS or equivalent built inside the power distribution panel or outside panel in wall mount enclosure (SP-1710), meter data

to transfer to BMS system via BACnet. Provide CT and voltage transformer as required. Refer to contract drawings for the branch circuit or feeders that require electric metering and BMS/BACnet connection. Refer to specification section 260913 “ELECTRICAL POWER MONITORING” for energy meters for branch circuits/Feeders..

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.

B. Panelboards:

1. NEMA PB 1, Type 1, lighting and appliance branch-circuit type.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

4. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt on circuit breakers. Plug in type breakers are not acceptable.

E. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.

1. External Control-Power Source: 120-V branch circuit .

F. Bus bars and lugs shall not be less than 98% conductivity, hard drawn copper. All copper bus connections shall be bolted with lock washers and joints shall be silver-plated.

G. Full capacity copper neutral bus in panelboards where neutrals are required.

H. Copper equipment grounding bus in panelboards where equipment grounding conductors are required.

I. Section designated "space" or "provision for future breaker' equipped to accept future circuit breakers.

J. GFCI (30mA Type) circuit breakers shall be provided for designated circuits.

K. Provide panel mount surge suppressor devices (TVSS), Type 2 for the panel boards that are indicated in drawings. Refer to specification section 264313 "Surge Protective Devices for Low-Voltage Electrical Power Circuits" for technical information on Type 2 surge protector devices.

L. Door Lock: Locks shall be of approved cylinder, paracentric type, Yale No. 511S, Key change No. 47. Two keys shall be supplied with each lock.

M. Column-Type Panelboards: Single row of overcurrent devices with narrow gutter extension and overhead junction box equipped with ground and neutral terminal buses.

N. Directories:

A directory consisting of a steel or aluminum frame with a non-breakable, non-inflammable plastic face with either cardboard or heavy white paper beneath shall be installed on the inside of the door of cabinets for all panelboards. Frame shall be welded to door or fastened by approved screws to a mat in such a manner as not to leave anything projecting on the outside of the door. The cardboard or heavy paper shall have typewritten directory thereon stating the following: The number of each circuit together with the name of circuits, load controlled, size of circuit feeder and subfeeder conductors. Directory frames shall be not less than 8" x 8".

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:
   a. Inverse time-current element for low-level overloads.
   b. Instantaneous magnetic trip element for short circuits.
   c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. MCCB Features and Accessories:
   a. Breaker handle indicates tripped status.
   b. UL listed for reverse connection without restrictive line or load ratings.
   c. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.

d. Ground-Fault Protection: relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
e. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on position.

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

2.7 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NECA 407 NEMA PB 1.1.

C. Mount top of trim 78 inch above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box.

E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

H. Install filler plates in unused spaces.

I. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-commercial grade receptacles, 125 V, 20 A, 2P, 3W.
2. Surge suppression type receptacle 125V, 20A, 2P, 3W.
3. GFCI receptacles, 125 V, 20 A, 2P, 3W.
4. Dual-Controlled Plug Load Receptacles 2P, 3W.
5. Decorator-style devices, 20 A, 2P, 3W.
6. Wall plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Coordinate with the receptacle that are part of the furniture being provided by other trades. Provide coordinated shop drawings indicating the furniture mounted receptacles and associated circuiting that matches with the furniture mounted circuit arrangement.

1.3 INFORMATIONAL SUBMITTALS

A. Source quality-control reports

B. Coordinate with the receptacles that are part of the furniture being provided by other trades. Provide coordinated shop drawings indicating the furniture mounted receptacles and associated circuiting that matches with the furniture mounted circuit arrangement. Any changes to the circuiting information provided in the contract drawings to match with the circuit information of proposed furniture shall be part of this contract and there will be no additional cost to the contract for these changes.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Straight-blade-type; Commercial Specification Grade minimum; compliance with NEMA WD 1; DSCC WC 596, AND UL 498 and UL 943 2006 Codes.

E. Device Color:

1. Wiring Devices Connected to Normal Power System: White As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Essential Electrical System: Red.
3. SPD Devices: Blue.
4. Isolated-Ground Receptacles: Orange As specified above, with orange triangle on face.

F. Wall Plate Color: For plastic covers, match device color.

G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Leviton Manufacturing Co., Inc.
   b. Pass & Seymour; Legrand North America, LLC.
   c. Hubbell Inc.
2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Leviton Manufacturing Co., Inc.
   b. Pass & Seymour; Legrand North America, LLC.
   c. Hubbell Inc.

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Weather-Resistant Duplex Receptacle, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Leviton Manufacturing Co., Inc.
   b. Pass & Seymour; Legrand North America, LLC.
   c. Hubbell Inc.

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

D. Transient Voltage Surgé Suppression Réceptacle TVSS; duplex (20A, 125V, 2P, 3W);

1. Hubbell Inc HBL5360SA
2. Leviton 5380
3. Pass & Seymour/Legrand PS5362-ISP

E. Floor mounted (Poke thru) receptacle : 2- Duplex (20A, 125V, 2P, 3W) plus 2 RJ-45 jack

1. WireMold # RC4ATCBS/COM75
2. Hubbell Inc.
3. Leviton
4. Or approved equal.

F. Twisted Lock receptacles Commercial Grade For use in the Telecommunication Rooms/IT/AV rooms

1. Single receptacle (30A, 125V, 2P 3W) (NEMA L530R):
   a. Leviton part# 2660
   b. Hubbell Part # HBLL530R
   c. Approved equal from Legrand.
2. Single receptacle (20A, 220V, 2P 3W) (NEMA L620R):
   a. Leviton Part# 2320
   b. Hubbell Part # HBLL530R
   c. Approved equal from Legrand.

G. Dual-Controlled Plug Load Receptacles:

1. Shall comply with UL 498 and shall be permanently marked with control symbol and “CONTROLLED” on the face of the actual outlet as required by 2014 NEC 406.3 and ASHRAE 90.1
2. Shall be Pass & Seymour #5362CD Series or approved equal.

3. Duplex receptacle 20A, 125V, 2 poles, 3W, grounded.

H. Under desk power dock, under mounted below the counter surface (Mockett outlet) with 2 power/dual charging USB
1. Easy-to-install under-desk mounting tabs. Refer to drawings for location. Coordinate with furniture/desk submittal.
2. 2 Power Outlets, 20A, 125V, 2 poles, 3W, grounded
3. Dual USB charger
4. UL listed
5. Shall be Doug Mockett # PCS99B or equivalent

2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Leviton Manufacturing Co., Inc.
b. Pass & Seymour; Legrand North America, LLC.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
a. Pass & Seymour; Legrand North America, LLC.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Leviton Manufacturing Co., Inc.
b. Pass & Seymour; Legrand North America, LLC.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-15R.

4. Type: Feed through.
5. Standards: Comply with UL 498 and UL 943 Class A.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.4 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Non-metalic
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
5. Material to cover existing back boxes after removal of existing outlets and switches: 0. Type 302 stainless steel 0.04-inch- thick.

C. Wall Plate Color: For plastic covers, match device color.

D. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant , die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
3. Install wiring devices after all wall preparation, including painting, is complete.

C. Device Installation:

1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right .
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

G. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 FIELD TEST:

A. Ensure that proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements of these Specifications.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:
   a. Control circuits.
   b. Enclosed switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data.
4. Fuse size for elevator feeders and elevator disconnect switches.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Spare parts (10 % of each size and type with min. of ½ a dozen)

1.4 ELECTRICAL SYSTEM COORDINATION

A. Rating and arrangement of fuses, or overcurrent devices on service switches, which have a rating above 601 amperes, shall be selectively coordinated

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Bussmann; Eaton, Electrical Sector.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-1: 250 600-V, zero- to 600-A rating, 200 kAIC , time delay.
2. Type RK-5: 250 600-V, zero- to 600-A rating, 200 kAIC , time delay.
3. Type CC: 600-V, zero- to 30-A rating, 200 kAIC .
4. Type CD: 600-V, 31- to 60-A rating, 200 kAIC .
5. Type J: 600-V, zero- to 600-A rating, 200 kAIC , time delay.
6. Type L: 600-V, 601- to 6000-A rating, 200 kAIC , time delay.
7. Type T: 250-V, zero- to 1200-A 600-V, zero- to 800-A rating, 200 kAIC .

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

F. All fuses shall be the product of the same manufacturer. All devices shall have the same fuse type of the same manufacturer.

2.3. SPARE FUSE CABINETS:

A. EXECUTION

a. INSTALLATION

1. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

b. IDENTIFICATION

1. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonfusible switches.
2. Fusable switches
3. Molded-case circuit breakers (MCCBs) type switch.
4. Enclosures.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source quality-control reports

2.2 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

E. Voltage Ratings

1. 250V rating for 120V, 208V circuits.

2. 600V rating for 277V and 480V circuits.

F. Solid neutral bar when neutral conductor is included with circuit.

G. Enclosed switches shall be lockable in “ON” position.

2.3 NONFUSIBLE/FUSABLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. General Electric

B. Non-Fusible Switch: Type HD, Heavy Duty, Three Pole, Single Throw, 240 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Fusible Switch, 800 A or Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position. General Duty switches are not acceptable.

D. Fusible Switch, 1200 A or Larger: Bolted pressure type, UL 977; operating mechanism shall utilize a rotary-mechanical bolting action to produce and maintain high clamping pressure on the switch blade after it engages stationary contacts.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. General Electric

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated 100 percent rated or series rated as indicated on the Drawings. Series rated equipment is not acceptable for this project.

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below .

G. Standards: Comply with UL 489 with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

I. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

J. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R) a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel).

C. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover directly operable through the front cover of the enclosure (NEMA 250 Type 1) directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R) externally operable with the operating mechanism being an integral part of the cover (NEMA 250 Types 7, 9). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

D. Enclosures designated as NEMA 250 Type 4, 4X stainless steel shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

E. NEMA 250 Type 3R enclosures for outdoor location and NEMA 250, Type 4 for wet and damp locations shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1 .
2. Outdoor Locations: NEMA 250, Type 3R .
3. Areas: NEMA 250, Type 4X , stainless steel .
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4 .

3.2 INSTALLATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Architect no fewer than 7 days days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Architect's written permission.
4. Comply with NFPA 70E.

B. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

C. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

G. Set field-adjustable circuit-breaker trip ranges to values indicated on the Drawings.

H. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6'-6". When shown as wall mounted, switches shall be mounted to horizontal strut supports. Free standing units shall be mounted on a free-standing strut system anchored to the floor, ceiling, and walls.

3.3 FIELD TEST

A. Test insulation resistance for each enclosed switch.
B. Test continuity of each line- and load-side circuit.

3.4 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

END OF SECTION 262816

SECTION 262913 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manual motor controllers.
2. Enclosed full-voltage magnetic motor controllers.
3. Enclosures.
4. Accessories.
5. Identification.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of magnetic controller.

1. Include plans, elevations, sections, and mounting details.
2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
3. Wire Termination Diagrams and Schedules: Include diagrams for signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
4. Include features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain BACnet compatible controllers of a single type through one source from a single manufacturer. Where BACnet compatible controllers are not available from the unit manufacturer, provide “gateway” to translate the unit manufacturer’s protocol to the BAC-net protocol.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.

C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

C.1 MANUAL MOTOR CONTROLLERS

A. Motor-Starting Switches (MSS): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on. Provide overload elements.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Eaton.
   b. Siemens Industry, Inc., Energy Management Division.
   c. Square D; Schneider Electric USA.
2. Standard: Comply with NEMA ICS 2, general purpose, Class A.
3. Configuration: Nonreversing .
4. Surface mounting.
5. Red, Green pilot light.
6. Additional Nameplates:

B. Fractional Horsepower Manual Controllers (FHPMC): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped. Provide overload elements

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Eaton.
   b. Siemens Industry, Inc., Energy Management Division.
   c. Square D; Schneider Electric USA.
   d. ABB

2. Configuration: Nonreversing .
3. Overload Relays: NEMA ICS 2, bimetallic class as schedule on Drawings.
4. Pilot Light: .

C.2 ENCLOSED FULL-VOLTAGE MAGNETIC MOTOR CONTROLLERS

A. Description: Across-the-line start, electrically held, for nominal system voltage of 600-V ac and less.

B. Provide factory-assembled combination starter and disconnect switch. Provide disconnect switch lockable in “ON” position.

C. Provide fusible disconnecting Means if indicated in drawings: NEMA KS 1, fusible switch with rejection-type fuse clips rated for fuses

D. Circuit-Breaker disconnecting means are acceptable subject to approval by the authority: NEMA AB 1, motor-circuit protector with field adjustable, short-circuit trip coordinated with motor locked-rotor amperes

E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. ABB

F. Standard: Comply with NEMA ICS 2, general purpose, Class A.

G. Configuration: Nonreversing .

H. Contactor Coils: Pressure-encapsulated type with coil transient suppressors when indicated.

1. Operating Voltage: Manufacturer's standard, unless indicated.

I. Control Power:

1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
   a. Spare CPT Capacity as Indicated on Drawings: 200 VA.

J. Overload Relays:

1. Thermal Overload Relays:
   a. Inverse-time-current characteristic.
   b. Class 10 tripping characteristic.
   c. Heaters in each phase shall be matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
   d. Ambient compensated.
   e. Automatic resetting.

K. Motor Control Push Button Stations and H-O-A Switches : Provide push button stations of the momentary contact type with pilot light, installed with a common faceplate. Provide “Hand-Off-Automatic” (H-O-A) switches for all starters controlling equipment with automatic actuating apparatus

L. Digital communication module (for BMS system), using -wire connection to host devices with a compatible port to transmit the following to the LAN:

1. Instantaneous rms current each phase, and 3-phase average.
2. Voltage: L-L for each phase, L-L 3-phase average, L-N each phase and L-N 3-phase average - rms.
3. Active Energy (kWh): 3-phase total.
4. Power Factor: Each phase and 3-phase total.
(Coordinate with the building BMS system integrator.)

C.3 ENCLOSURES

A. Comply with NEMA 250, type designations as indicated on Drawings, complying with environmental conditions at installed location.

B. The construction of the enclosures shall comply with NEMA ICS 6.

C.4 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

1. Push Buttons, Pilot Lights, and Selector Switches: Standard-duty, except as needed to match enclosure type. Heavy-duty or oil-tight where indicated in the controller schedule.
   a. Push Buttons: As indicated in the controller schedule.
   b. Pilot Lights: As indicated in the controller schedule.

B. Motor protection relays shall be with solid-state sensing circuit and isolated output contacts for hardwired connections.

1. Phase-failure.
2. Phase-reversal, with bicolor LED to indicate normal and fault conditions. Automatic reset when phase reversal is corrected.
3. Under/overvoltage, operate when the circuit voltage reaches a preset value, and drop out when the operating voltage drops to a level below the preset value. Include adjustable time-delay setting.

C.5 IDENTIFICATION

A. Controller Nameplates: Laminated acrylic or melamine plastic signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.

B. Arc-Flash Warning Labels:

1. Comply with requirements in Section 260553 "Identification for Electrical Systems." Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis. Labels shall be machine printed, with no field-applied markings.
   a. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
      1) Location designation.
      2) Nominal voltage.
      3) Flash protection boundary.
      4) Hazard risk category.
      5) Incident energy.
      6) Working distance.
      7) Engineering report number, revision number, and issue date.
   b. Labels shall be machine printed, with no field-applied markings.

D. EXECUTION

D.1 INSTALLATION

A. Comply with NECA 1.

B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems" unless otherwise indicated.

C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

E. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.

A. In general, roof fan motor circuit wiring is run to starters in grouped locations. Starters shall be mounted on steel framework where shown on Drawings.

Pilot light assemblies shall be installed in the covers of respective starters

D.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D.3 SYSTEM FUNCTION TESTS

A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.

1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
3. Verify the correct operation of sensing devices, alarms, and indicating devices.

B. Motor controller will be considered defective if it does not pass the system function tests and inspections.

C. Prepare test per NETA ATS and inspection reports.

D.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain switchgear.

END OF SECTION 262913

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of LED luminaires:

1. Cylinder.
2. Downlight.
3. Highbay, linear.
4. Linear industrial.
5. Recessed, linear.
6. Surface mount, linear.
7. Surface mount, nonlinear.
8. Suspended, linear.

B. Provide luminaires as per product data, type of fixtures, model number, manufacturer and descriptions shown in lighting fixture schedules and plans indicated in contract drawings.

C. Provide luminaires, supports and accessories including plaster frames, trim rings and back boxes for plaster, drywall, or concrete ceilings as necessary.

D. Coordinate with other trades to avoid conflicts between installation of luminaires and supports with the installation of mechanical equipment, ceiling structures, etc.

E. All luminaires shall operate on nominal 120/277 volts, 60 Hz single phase service as indicated on the Drawings and in the Specifications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
2. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings:.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Provide Photometric Calculation of each interior spaces to comply with minimum IES recommended FC level as well as 2020 NYS energy compliance requirements.

D. Sustainable Design Submittals:

1. Product Data: Indicating luminaire is certified by ENERGY STAR .

E. Submission of Substitute Luminaires upon written approval from the authority(luminaires other than specified herein or on the Lighting fixture Schedule in contract drawings).

1. Submittals for substitute luminaires shall be the standard print catalog sheets from the manufacturers (CADD drawings and computer printouts are not acceptable).

2. Substitute luminaires shall meet or exceed photometric quality of luminaires designated on the schedule. Photometric data of substitute luminaires shall be substantiated by an independent testing lab, such as I.T.L. Photometric data by Lumen Micro or similar software programs are not acceptable.

3. Substitute luminaires shall meet or exceed the quality of the luminaires designated on luminaires schedule in construction, finishing, materials, reflector, diffuser etc.

4. Substitute luminaires shall closely match the appearance, dimensions and features of the luminaires designated.

5. Submit one sample of each type of substitute luminaires as requested, with one set of mounting hardware for approval.

6. In order to ensure that the work is performed in an orderly and expeditious manner, the Contractor

7. Provide Photometric Calculation of each interior spaces to comply with minimum IES recommended FC level as well as 2020 NYS energy compliance requirements

8. No more than three (3) submittals shall be permitted for substitution of each specific luminaire type. Should the third submittal be rejected, the Contractor shall be required to provide the luminaires specified on the lighting fixture schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Product Certificates: For each type of luminaire.

C. Sample warranty.

D. Mock-up

E. Spare Parts: Provide complete luminaires to the Campus of 5% of the order Delivered with a minimum of 2 fixtures for each type. Spares shall be provided and delivered to the Authority's Representative with an itemized list and a receipt taken, certifying that these spare parts have been delivered securely packed and received in acceptable condition

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Provide luminaires from a single manufacturer for each luminaire type.

B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires. Final color temperature selection of each luminaires shall be determined and approved by the Campus and Architect office prior to ordering the luminaires.

A. Qualifications

1. Manufacturer: Provide products of firms listed in Part 2 that are regularly engaged in the manufacture of lighting fixtures and components of types and ratings required and whose products have been in satisfactory use in similar service for not less than 5 years. The manufacturer of the lighting fixtures and components shall comply with the provisions of the appropriate code and standards. All fixtures shall be pretested before shipping.

B. Mock-Up

1. If a substitution is proposed for a space/classroom luminaires, the Contractor is to install a mock-up utilizing the proposed luminaire(s) for an entire classroom in a school designated by the Authority to prove out the quantity and quality of light documented in the lighting submittals. The Contractor is responsible to arrange with the designated school to install the luminaires after school hours and pay all custodial fees. After review by the Authority, the Contractor shall reinstall the original luminaires if the luminaire(s) is deemed not to be acceptable or the school does not desire to retain the luminaire.

C. Design Qualification Testing

1. Design Qualification Testing shall be performed by a National Voluntary Laboratory Accreditation Program (NVLAP) testing facility. Such testing may be performed by the manufacturer or an independent testing lab hired by the manufacturer on new luminaire designs and when a major design change has been implemented on an existing design. A major design change is defined as a design change (electrical or physical), which changes any of the performance characteristics of the luminaire, results in a different circuit configuration for the power supply, or changes the layout of the individual LEDs in the module.

2. A quantity of two units for each design shall be submitted for Design Qualification Testing.

3. Product submittals shall be accompanied by product specification sheets or other documentation that includes the designed parameters as detailed in this specification. These parameters include (but are not limited to):

a. Maximum power in Watts.

b. L80 in hours, when extrapolated for the worse case operating temperature. TM21 report shall be submitted to demonstrate this.

D. Product submittals shall be accompanied by performance data that is derived in accordance with appropriate IESNA testing standards and tested in a laboratory that is NVLAP accredited for Energy Efficient Lighting Products

1.6 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires and drivers that fail in materials, loss of performance and workmanship within specified warranty period. All warranty documentation shall be provided to customer prior to the first shipment

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:
   a. "USE ONLY" and include specific lamp type.
   b. Lamp diameter, shape, size, wattage, and coating.
   c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

2.2 CYLINDER .

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V .

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.
2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 90 . CCT of 3500K-4000K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
   a. Bulb shape complying with ANSI C78.79, C78.50.
   b. Lamp base complying with ANSI C81.61, or IEC 60061-1.
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

2.3 DOWNLIGHT .

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V .

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.

2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 90 . CCT of 3500K-4000k .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
   a. Bulb shape complying with ANSI C78.79, C78.50
   b. base complying with ANSI C81.61 or IEC 60061-1.
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. Universal mounting bracket.
4. Integral junction box with conduit fittings.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Fixed lens.
2. Medium light distribution.
3. Clear glass .
4. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
5. Glass: Annealed crystal glass unless otherwise indicated.
6. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

2.4 HIGH BAY, LINEAR.

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V.

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.

2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 80 90 . CCT of 3500K-4000K .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. Lamps: LED array or board
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. With integral mounting provisions.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
5. The Luminaries meet the design criteria for height, foot-candle with no glare

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. NEMA LE 4.

2.5 LINEAR INDUSTRIAL .

A. Manufacturers: Refer to lighting fixture schedule in contract drawing E501, for the manufacturer of luminaires and list of approved equals.

B. Nominal operating voltage 120/277V.

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.
2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 80 90 . CCT of 3500K-4000K .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.

6. Internal driver.
7. Lamps: LED array or board
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.6 RECESSED, LINEAR .

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V.

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.
2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 80 90 . CCT of 3500K-4000K .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. Lamps: LED array or board
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.

2. painted finish.
3. With integral mounting provisions.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. NEMA LE 4.

2.7 SURFACE MOUNT, LINEAR .

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V.

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.
2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 80 90 . CCT of 3500K-4000K .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. Lamps: LED array or Board
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. With integral mounting provisions.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are

designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

2.8 SURFACE MOUNT, NONLINEAR

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V.

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.
2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 80 90 . CCT of 3500k-4000k .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
   a. Bulb shape complying with ANSI C78.79.
   b. Lamp base complying with or IEC 60061-1.
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. With integral mounting provisions.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Prismatic glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

2.9 SUSPENDED, LINEAR .

A. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals.

B. Nominal Operating Voltage: 120/277V .

C. LED Lamp:

1. Lumen output as per lighting fixtures schedule shown in contract drawings.
2. Minimum allowable efficacy of 90 lm/W.
3. CRI of minimum 80 90 . CCT of 3500k-4000k .
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. Lamps: LED array or Board
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. With integral mounting provisions.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear glass .
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

2.10 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for sheet steel.

C. Stainless Steel:

1. 1. Manufacturer's standard grade.
2. 2. Manufacturer's standard type, ASTM A240/240M.

D. Galvanized Steel: ASTM A653/A653M.

E. Aluminum: ASTM B209.

2.11 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.12 LUMINAIRE COMPONENTS/ACCESSORIES

A. Stems and Hickeys

1. Stems for pendant luminaires shall be standard pipes not less than 3/8" diameter. Stems shall be no less than 6" long with a cut thread. Pipe stems at luminaire end shall have a length of threads of approximately $1^{1}/_{2}$" for luminaire alignment.

2. Each stem shall be provided with a brass/steel swivel or other self-aligning device of type approved by the Authority, a hickey, a malleable iron bushing, a canopy, minimum of three locknuts/washers (one locknut/washer above and two below for locking purpose) and other accessories for the safe support of pendant luminaires.

B. Luminaire Finishes

1. The finish of all luminaires not described on the luminaire schedule or in the Specifications shall be as selected by the Authority's Representative. The Con-

tractor shall submit a color chart to the Authority's Representative for selection of finish.

a. Exterior Luminaires shall have an anodized or baked powder coat finish.

D. Luminaire-mounted Occupant Sensors

1. Occupant sensors shall be the luminaire manufacturer’s recommended unit compatible with the luminaire.

2. Sensor shall be auto-on to 100% and programmed such that in the off position the luminaires are dimmed to 50%.
3. Sensor mount locations in luminaire(s) shall be determined by the manufacturer’s specifications based on luminaire location.

2.13 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Comply with requirements in Section 260519 "Electrical Power Conductors and Cables" for wiring connections.

F. Recessed Luminaires weighting more than 50 pounds

1. A recessed luminaire weighing more than 50 pounds shall not be installed directly on a concealed or exposed ceiling spline of a mechanical acoustical ceiling system. Such luminaires shall only be supported from the building structure.

2. Support recessed luminaires with hanger rods, 3/16" in diameter minimum, attached to structural steel, concrete, beams, joists, trusses, and channels.

4. Contractor shall provide additional running bars or channels required to support the luminaire.

G. Recessed Luminaires weighting 50 pounds or less

1. Recessed luminaires weighting 50 pounds or less may be directly supported by suspended ceiling grid (Z bars, T grid, cross beams) providing that the maximum allowable deflection ($1/360^{th}$ of the span) is not exceeded. Recessed luminaires so supported shall be additionally secured with safety chains or aircraft cable that can fully support the weight of the luminaire in the event of a failure of the suspended ceiling. Safety chains or aircraft cable shall support each luminaire at two diagonal corners and shall be attached to the building structural steel or concrete.

H. Pendant Mounted Luminaires on Non-Suspended Ceiling

Support pendant mounted luminaires with stems, 3/8" in diameter minimum, or with aircraft cable rated to support 800# load, vertically attached to structural steel, concrete, beams, joists, and trusses or stainless steel wire.

1. Contractor shall provide channel supports required to support the pendant luminaires.

2. Where approved, channel supports may span and rest upon the lower chord of trusses.

3. Where approved, channel supports may span and be attached to the underside of beams, joists, or trusses.

4. Direct/indirect luminaires shall be supported by approved aircraft cables, vertically attached to building structural steel or concrete in accordance with the manufacturers installation recommendations. Cable shall be rated to 800 lb. load

I. Surface and Pendant Mounted Luminaires on Suspended Ceiling

1. Surface mounted and pendant luminaires shall be supported above suspended ceiling by hanger rods, 3/16" in diameter minimum, or by 12-gage hanger wire, vertically attached to structural steel or concrete.
2. Below suspended ceiling, support pendant luminaires with 3/8" stems or stainless steel cable.

3. Direct/indirect luminaires shall be supported by approved aircraft cables, vertically attached to building structural steel or concrete in accordance with the manufacturers installation recommendations. The luminaires' suspension cable shall be independently rated to support an 800 lbs load, and this shall include the suspension adjustment device that shall be located on luminaires

J. General:

1. The Contractor shall be responsible for the proper and safe mounting and support of all luminaires. Installation shall meet all the requirements of the National Electrical Code. Provide all items of equipment (stems, hangers, rods, inserts, boxes, brackets, yokes, channels, frames, etc.) required to adequately and safely support each luminaire in a manner acceptable to the Authority.

2. Provide a luminaire at each location shown on Drawings of the type indicated by symbol or other notation. If the type is not specifically noted on Drawings, the Contractor shall provide without extra cost luminaires of the same type called for under similar condition elsewhere on the Drawings as determined by the Authority.

3. The Contractor shall examine the drawings and coordinate closely with the all General Construction trades on all work involved with each type of luminaire to be installed. Contractor shall verify all sizes, locations and conditions under which luminaire are to be installed. Provide plaster frames and running bars (black iron) etc. as required.

4. The Contractor is required to protect luminaires from damage during installation, up to time of acceptance by the Authority. Any broken or marred luminaire, glassware, plastics, lamps, etc. shall be replaced by the Contractor at no additional cost to the Authority.

5. A suitable outlet box shall be provided by the Contractor for each luminaire provided. The box shall be cast into concrete or supported using two double split type anchors when installed in concrete walls or ceiling.

6. A surface or pendant type luminaire, regardless of its weight, shall not be mounted directly on the concealed or exposed ceiling spline of a lightweight, mechanical acoustical ceiling system. Such luminaires shall be supported from the building structure.

7. For all pendant mounted luminaires, regardless of weight and ceiling types, provide outlet boxes capable of supporting up to 150 pounds, Westinghouse model 01050/01052 or equal

a. IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

b. FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power/generator power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119

SECTION 265213 - EMERGENCY AND EXIT LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide line voltage (120/277V) Illuminated Exit Signs.
2. Materials.
3. Luminaire support components.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of exit sign.
   a. Include data on features, accessories, and finishes.
   b. Include physical description of unit and dimensions.
   c. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.

B. Shop Drawings:

1. For nonstandard or custom luminaires.
   a. Include plans, elevations, sections, and mounting and attachment details.
   b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   c. Include diagrams for power, signal, and control wiring.

C. Samples: For each product and for each color and texture specified.

D. Samples for Verification: For each type of luminaire.

1. Include Samples of luminaires and accessories to verify finish selection.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of luminaire.

B. Sample Warranty: For manufacturer's warranty.

1.4 WARRANTY

A. Special Installer Extended Warranty for Emergency and Exit Lighting: Installer warrants that fabricated and installed emergency luminaires and exit signs, perform in accordance with specified requirements and agrees to repair or replace components and assemblies that fail to perform as specified within extended warranty period.

1. Extended Warranty Period: Two year(s) from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 EXIT SIGNS

A. General Characteristics: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Sign :

1. Subject to compliance with requirements, provide products by the following:
   a. Lithonia Lighting; Acuity Brands Lighting, Inc, Atlite.. Refer to contract drawings for lighting fixture schedule with model number and manufacturer.
2. Options:
   a. Operating at nominal voltage of 120/277V(ac).
   b. Lamps for AC Operation:
      1) LEDs; 50,000 hours minimum rated lamp life.
   c. Precision-molded, textured letters – 6" high with 3/4" stroke, with 100 ft viewing distance rating, based upon UL924 standard. Chevron indicator direction must be specified
   d. Directional exit sign shall be as shown in drawings.
   e. Refer to lighting floor plans for single or double face requirement.
   f. High-polish, injection-molded virgin acrylic panel, ultrasonically welded to eliminate visible hardware. Graduated depth of molded letters provides uniform light distribution on graphics. Standard housing finish is brushed aluminum

2.2 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components must be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Housings:

1. Extruded aluminum housing trim mounts flush onto wall or ceiling.

2. Recessed rough-in section constructed of 20-gauge, die-formed galvanized steel.
3. Mounting canopy for top mount is constructed of extruded aluminum housing to match housing finish.

C. Conduit: ERMC , minimum metric designator 21 (trade size 3/4).

2.3 METAL FINISHES

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast. Finish shall be matte black acrylic with brushed aluminum face.

2.4 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

B. The Contractor shall be responsible for the mounting and support of all exit signs. Provide all items of equipment (stems, hangers, rods, inserts, boxes, brackets, channels, frames, etc.) required to adequately and safely support each exit sign fixture in a manner acceptable to the Authority.

C. The Contractor is required to protect fixtures from damage during installation, up to time of acceptance by the Authority. Any broken or marred fixtures shall be replaced by the Contractor at no additional cost to the Authority.

D. Pendant Mounted Fixtures on Suspended Ceiling

1. Pendant mounted exit sign shall be supported above suspended ceiling by hanger rods, 3/8” in diameter minimum, vertically attached to approve straps, bars, channels secured to the black iron where available, or to structural steel or concrete.

E. Surface mounted exit signs

1. Surface mounted exit signs shall have their own back boxes, custom fitted to the signs. Ceiling and end wall mounted exit signs shall be provided with a die cast canopy and a back box. All surface mounted exit signs and their back boxes shall be anchored to the wall at four (4) points

3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Progress Inspections

1. The contractor will carry out all progress inspections in accordance with 2020 NYS Building Code.

3.4 ADJUSTING

A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:

1. Inspect luminaires. Replace lamps, exit signs, and luminaires that are defective.
   a. Parts and supplies must be manufacturer's authorized replacement parts and supplies.
2. Conduct short-duration tests on all emergency lighting.

3.5 PROTECTION

A. Remove and replace exit signs that are damaged or caused to be unfit for use by construction activities.

END OF SECTION 265213

SECTION 265619 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.

B. Provide luminaires as per product data, type of fixtures, model number, manufacturer and descriptions shown in lighting fixture schedules and plans indicated in contract drawings.

C. Provide luminaires, supports and accessories including back boxes as necessary for wall mounting.

D. Coordinate with other trades to avoid conflicts between installation of luminaires and supports with the installation of other elements etc.

E. All luminaires shall operate on nominal 120/277 volts, 60 Hz single phase service as indicated on the Drawings and in the Specifications.

F. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Provide Photometric Calculation of each exterior spaces to comply with minimum IES recommended FC level as well as 2020 NYS energy compliance requirements.

D. Sustainable Design Submittals:

1. BUG Ratings: Product Data indicating BUG ratings of all installed exterior luminaires.
2. Luminaire Calculations: Product Data indicating lumen emittance and vertical illuminance.
3. Product Data: Indicating luminaire is certified by ENERGY STAR .

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale and coordinated.

B. Product Certificates: For each type of the following:

1. Luminaire.

C. Sample warranty.

D. Spare Parts: Provide complete luminaires to the Campus of 5% of the order Delivered with a minimum of 2 fixtures for each type. Spares shall be provided and delivered to the Authority's Representative with an itemized list and a receipt taken, certifying that these spare parts have been delivered securely packed and received in acceptable condition.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.7 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires and drivers that fail in materials, loss of performance and workmanship within specified warranty period. All warranty documentation shall be provided to customer prior to the first shipment

B. Warranty Period: 5 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp base complying with ANSI C81.61 or IEC 60061-1.

F. CRI of 90. CCT of 4100 K .

G. L70 lamp life of 50,000 hours.

H. Lamps dimmable from 100 percent to 0 percent of maximum light output.

I. Nominal Operating Voltage: 120/277V.

J. In-line Fusing: On the primary for each luminaire .

K. Lamp Rating: Lamp marked for outdoor use and in enclosed locations.

L. Source Limitations:

1. Obtain luminaires from single source from a single manufacturer.
2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 LUMINAIRE TYPES

A. Area and Site:

1. Manufacturers: Refer to lighting fixture schedule in contract drawings, for the manufacturer of luminaires and list of approved equals
2. Luminaire Shape: As indicated on contract drawings.
3. Mounting: Building with stainless-steel arm, 11 inches in length.
4. Luminaire-Mounting Height: 15 ft FGL .
5. Distribution: As indicated on contract drawings.

2.3 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Epoxy-coated steel . Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:

1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

2.4 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish

surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.

2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
   a. Color:
      1) As selected from manufacturer's standard catalog of colors.
      2) Match Architect's sample of manufacturer's standard color.
      3) As selected by Architect from manufacturer's full range.

2.5 LED ENGINE

A. The Correlated Color Temperature (CCT) of LED modules shall be 3500K and shall be consistent through the entire outdoor project. Color Rendering Index (CRI) shall be minimum 70 for all outdoor lighting.

B. The performance of LED luminaires shall be tested according to the IESNA standards LM-79 “Electrical and Photometric Measurements of Solid-State Lighting Products” and LM-80 “Measuring Lumen Maintenance of LED Light Sources.” Reports shall be available upon request.

C. LED luminaires shall have a minimum 50,000 life with the minimum 70% lumen maintenance.

D. Electrical circuitry for weather exposed luminaires shall have integral surge protector rated for a minimum of 20KA and 10KV.

E. Drivers shall be suitable for 0-10V dimming control and have greater than .9 power factor and less than 20% Total Harmonic Distortion.

F. Optics

1. Unless otherwise noted on The Contract Drawings, optics shall be Dark Sky Compliant with NEMA Type II, Type III, Type IV or Type V (VS).

2. Weather exposed optical elements shall be shatter resistant, UV resistant and field replaceable

2.6 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Fasten luminaire to structural support.

E. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls .

G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.

I. Coordinate layout and installation of luminaires with other construction.

J. Adjust luminaires that require field adjustment or aiming.

K. Comply with requirements in Section 260519 “Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

END OF SECTION 265619

SECTION 26 56 68 – EXTERIOR ATHLETIC FIELD LIGHTING

Lighting System with LED Light Source

PART 1 – GENERAL

1.1 SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.

B. The purpose of these specifications is to define the lighting system performance and design standards for North Rockland High School Stadium using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.

C. The sports lighting will be for the following venues:

1. Multipurpose Field
2. Track

D. The primary goals of this sports lighting project are:

1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors.
3. Cost of Ownership: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
4. Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.

E. All lighting designs shall comply with IESNA RP-6-20.

1.2 LIGHTING PERFORMANCE

A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-20, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Football	50 footcandles	2:1	72	30’ x 30’
Soccer	50 footcandles	2:1	84	30’ x 30’
Track	20 footcandles	4:1	48	30’ x 30’

Bleachers – Normal Power	10 footcandles	4:1	East – 34 West – 88	10’ x 10’
Bleachers – Egress Power	5 footcandles	2:1	East – 34 West – 88	10’ x 10’

B. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.

C. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
2	F1, F2	90’
2	F3, F4	80’

1.3 ENVIRONMENTAL LIGHT CONTROL

A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.

B. Spill Light and Glare Control: To minimize impact on adjacent properties, spill light and candela values must not exceed the following levels taken at 3 feet above grade.

	Maximum
Horizontal Footcandles at South Residential Setback	0.05 fc
Vertical Footcandles at South Residential Setback	0.15 fc
Candela at South Residential Setback	3350 cd

C. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights. Illumination level shall be measured in accordance with the IESNA LM-5-04 after 1 hour warm up.

D. The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified testing laboratory with a minimum of five years experience or by a manufacturer’s laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

1.4 Cost of Ownership

A. Manufacturer shall submit a 25-year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.

PART 2 – PRODUCT

2.2 SPORTS LIGHTING SYSTEM CONSTRUCTION

A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.

B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

C. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and cross-arm assembly.
2. Non-approved pole technology:
    a. Square static cast concrete poles will not be accepted.
    b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long-term performance concerns.
3. Lighting systems shall use concrete foundations. See Section 2.4 for details.
    a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection; actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
    b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-inforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
4. Manufacturer will supply all drivers and supporting electrical equipment
    a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure. Drivers mounted at the top of the poles are not allowed.
    b. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.
5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
6. All luminaires, visors, and cross-arm assemblies shall withstand 150 mi/h winds and maintain luminaire aiming alignment.
7. Control cabinet to provide remote on-off control, monitoring, and entertainment features of the lighting system. See Section 2.3 for further details.
8. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
    a. Integrated grounding via concrete encased electrode grounding system.
    b. If grounding is not integrated into the structure, the manufacturer shall supply grounding

electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780.The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

A. Electric Power Requirements for the Sports Lighting Equipment:
   1. Electric power: 480 Volt, 3 Phase
   2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

B. Energy Consumption: The kW consumption for the field lighting system shall be 65kW or less.

2.3 CONTROL

A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.

B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.

C. Dimming: System shall provide for 3-stage dimming (high-medium-low). Dimming will be set via scheduling options (Website, app, phone, fax, email).

D. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

   The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute “early off” commands by phone. Scheduling tool shall be capable of setting curfew limits.

   Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

E. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).

F. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.

   Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

   1. Cumulative hours: shall be tracked to show the total hours used by the facility
   2. Report hours saved by using early off and push buttons by users.

G. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.

H. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.

2.4 STRUCTURAL PARAMETERS

A. Wind Loads: Wind loads shall be based on the 2018 International Building Code. Wind loads to be calculated using ASCE 7-16, an ultimate design wind speed of 115 mph and exposure category C.

B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).

C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL

A. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:

1. Providing engineered foundation embedment design by a registered engineer in the State of New York for soils other than specified soil conditions;
2. Additional materials required to achieve alternate foundation;
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

A. Delivery Timing Equipment On-Site: The equipment must be on-site 8-10 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.

B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 years. These levels will be specifically stated as "guaranteed" on the illumination summary provided by the manufacturer.
2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 WARRANTY AND GUARANTEE

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 – DESIGN APPROVAL

4.0 PRE-BID SUBMITTAL REQUIREMENTS (Non-Approved Products)

A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.0.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.

B. **Approved Product: Musco's Light-Structure System™ with TLC for LED™** is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.

D. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner's representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS (NOT PRE-APPROVED) 10 DAYS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. ***Submit checklist below with submittal.***

Yes/ No	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
	B	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: a. Field Name, date, file number, prepared by b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Lighting design showing glare along the boundary line in candela. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	E	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5-years experience.
	F	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
	G	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of New York, if required by owner.
	H	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system. They will also provide ten (10) references of customers currently using proposed system in the state of New York.
	I	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of New York.
	J	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of New York.
	K	Project References	Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed in the state of New York. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
	L	Product Information	Complete bill of material and current brochures/cut sheets for all products being provided.

	M	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
	N	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.
	O	Cost of Ownership	Document cost of ownership as defined in the specification. Identify energy costs for operating the luminaires. Maintenance cost for the system must be included. All costs should be based on 25 Years
	P	Environmental Light Control Design	Environmental glare impact scans must be submitted showing the maximum candela from the field edge on a map of the surrounding area until 500 candela or less is achieved.

SECTION 284621 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Addressable fire-alarm system.
2. Fire-alarm control unit (FACU).
3. Manual fire-alarm boxes.
4. System smoke detectors.
5. Carbon monoxide detectors.
6. Heat detectors.
7. Multicriteria and multisensor fire detectors.
8. Fire-alarm notification appliances.
9. Fire-alarm graphic annunciators.
10. Fire-alarm addressable interface devices.
11. Digital alarm communicator transmitters (DACTs).

1.2 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. FACU: Fire-alarm control unit.

C. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.3 ACTION SUBMITTALS

A. Approved Permit Submittal: Submittals must be approved by authorities having jurisdiction prior to submitting them to Architect.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, and details, including details of attachments to other Work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include written statement from manufacturer that equipment and components have been tested as a system and comply with requirements in this Section and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

D. Delegated Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1. Drawings showing location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of device.
2. Design Calculations: Calculate requirements for selecting spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Seismic Performance Certificates: For FACU, accessories, and components, from manufacturer. Include the following information:
   a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   c. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.

B. Field quality-control reports.

C. Qualification Statements: For Installer.

D. Sample Warranty: Submittal must include line item pricing for replacement parts and labor.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

   a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
   b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
   c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
   d. Riser diagram.
   e. Device addresses.
   f. Record copy of site-specific software.
   g. Provide "Inspection and Testing Form" in accordance with "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
      1) Equipment tested.
      2) Frequency of testing of installed components.
      3) Frequency of inspection of installed components.
      4) Requirements and recommendations related to results of maintenance.
      5) Manufacturer's user training manuals.
   h. Manufacturer's required maintenance related to system warranty requirements.
   i. Abbreviated operating instructions for mounting at FACU

B. Software and Firmware Operational Documentation:

   1. Software operating and upgrade manuals.
   2. Program Software Backup: On USB/CD/Cloud.
   3. Device address list.
   4. Printout of software application and graphic screens.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Lamps for Strobe Units: Quantity equal to **10** percent of amount installed, but no fewer than one unit.
   2. Smoke Detectors, Heat Detectors: Quantity equal to **10** percent of amount of each type installed, but no fewer than one unit of each type.
   3. Detector Bases: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
   4. Keys and Tools: One extra set for access to locked or tamperproofed components.
   5. Audible and Visual Notification Appliances: One of each type installed.
   6. Fuses: Two of each type installed in system. Provide in box or cabinet with compartments marked with fuse types and sizes.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Personnel must be trained and certified by manufacturer for installation of units required for this Project.
2. Installation must be by personnel certified by NICET as fire-alarm technician.
3. Obtain certification by NRTL in accordance with NFPA 72.
4. Licensed or certified by authorities having jurisdiction.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:

1. Addressable system, with horn and strobe notification for evacuation.

B. Performance Criteria:

1. Regulatory Requirements:
   a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.
2. General Characteristics:
   a. Automatic sensitivity control of certain smoke detectors.
   b. Fire-alarm signal initiation must be by one or more of the following devices:
      1) Manual stations.
      2) Heat detectors.
      3) Smoke detectors.
      4) Fire pump running.
   c. Fire-alarm signal must initiate the following actions:
      1) Continuously operate alarm notification appliances
      2) Identify alarm and specific initiating device at FACU
      3) Transmit alarm signal to remote alarm receiving station.
      4) Unlock electric door locks in designated egress paths.
      5) Record events in system memory.
      6) Indicate device in alarm on graphic annunciator.
   d. Supervisory signal initiation must be by one or more of the following devices and actions:

1) FACU has lost communication with network.

e. System trouble signal initiation must be by one or more of the following devices and actions:
   1) Open circuits, shorts, and grounds in designated circuits.
   2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
   4) Loss of primary power at FACU.
   5) Ground or single break in internal circuits of FACU.
   6) Abnormal ac voltage at FACU.
   7) Break in standby battery circuitry.
   8) Failure of battery charging.
   9) Abnormal position of switch at FACU.

f. System Supervisory Signal Actions:
   1) Initiate notification appliances.
   2) Identify specific device initiating event at FACU.
   3) Record event on system printer.
   4) Transmit trouble or supervisory signal to remote alarm receiving station.
   5) Display system status on graphic annunciator.

g. Document Storage Box:
   1) Description: Enclosure to accommodate standard 8-1/2-by-11 inch manuals and loose document records. Legend sheet will be permanently attached to door for system required documentation, key contacts, and system information. Provide two key ring holders with location to mount standard business cards for key contact personnel.
   2) Material and Finish: 18-gauge cold-rolled steel; four mounting holes.
   3) Color: Red powder-coat epoxy finish.
   4) Labeling: Permanently screened with 1 inch high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink.
   5) Security: Locked with 3/4 inch barrel lock. Provide solid 12 inch stainless steel piano hinge.

2.2 FIRE-ALARM CONTROL UNIT (FACU)

A. Honeywell 6700 Addressable Fire Alarm Control Panel

B. Description: Field-programmable, microprocessor-based, modular, power-limited design with electronic modules.

C. Performance Criteria:

1. Regulatory Requirements: Comply with NFPA 72 and UL 864.
2. General Characteristics:
   a. System software and programs must be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining information through failure of primary and secondary power supplies.
   b. Include real-time clock for time annotation of events on event recorder
   c. FACU must be listed for connection to central-station signaling system service.

d. Provide nonvolatile memory for system database, logic, and operating system and event history. System must require no manual input to initialize in the event of complete power down condition. FACU must provide minimum 500-event history log.
e. Addressable Initiation Device Circuits: FACU must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.
    1) Addressable Control Circuits for Operation of Notification Appliances
f. Fire-Alarm Annunciator: Arranged for interface between human operator at FACU and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and programming and control menu.
g. Alphanumeric Display and System Controls: Arranged for interface between human operator at FACU and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and programming and control menu.
h. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
    1) Pathway Class Designations: NFPA 72, Class B.
    2) Install fault circuit isolators to comply with circuit performance requirements of NFPA 72 or with manufacturer's written instructions, whichever is more conservative.
i. Serial Interfaces:
    1) One USB/Ethernet port for PC configuration.
j. Smoke-Alarm Verification:
    1) Initiate audible and visible indication of "alarm-verification" signal at FACU.
    2) Activate approved "alarm-verification" sequence at FACU and detector.
    3) Sound general alarm if alarm is verified.
k. Notification-Appliance Circuit:
    1) Audible appliances must sound in three-pulse temporal pattern, as defined in NFPA 72.
    2) Visual alarm appliances must flash in synchronization where multiple appliances are in same field of view, as defined in NFPA 72.
l. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to remote alarm station.
m. Preamplifiers, amplifiers, and tone generators must automatically transfer to backup units, on primary equipment failure.
n. Primary Power: 24 V(dc) obtained from 120 V(ac) service and power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, and supervisory signals supervisory and DACT must be powered by 24 V(dc) source.
o. Alarm current draw of entire fire-alarm system must not exceed 80 percent of power-supply module rating.
p. Secondary Power: 24 V(dc) supply system with batteries, automatic battery charger, and automatic transfer switch.
q. Batteries: Sealed, lead acid

D. Accessories:

1. Instructions: Computer printout or typewritten instruction card mounted behind plastic or glass cover in stainless steel or aluminum frame. Include interpretation and describe

appropriate response for displays and signals. Briefly describe functional operation of system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes must be finished in red with molded, raised-letter operating instructions in contrasting color; must show visible indication of operation; and must be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Provide an addressable manual pull station at each location indicated on the Drawings or called for in the Specifications.
2. Each pull station shall be addressable manual pull lever double-action type.
3. Each pull station shall have hinged inner and outer doors with the inner door locked. A common key shall be required to gain access for resetting the station. Instructions for operating station shall appear on front of the outer door.
4. The pull station shall be interfaced into the addressable system by means of an internal or external addressable interface module.
5. For surface or semi-flush mounting, the mechanism shall be set into a separate stamped steel box with one 3/4” knockout. All parts shall have a baked enamel red finish and exposed edges shall be rounded. Pull stations with internal module shall be UL listed for use with the FACP.
6. Pull stations shall be set so that the top of the operating lever of station shall be 3’-6” to 4’-0” above the finished floor. The Contractor shall report to the Representative any interference with wainscot, or other construction or mechanical equipment.
7. False Fire Alarm Stopper Cover: Provide false fire alarm stopper cover to fit every pull station shown on the drawings, with a maximum protrusion from the face of the wall of 4” to meet ADA requirements.

2.4 SYSTEM SMOKE DETECTORS

A. Photoelectric Smoke Detectors:

1. The Contractor shall provide intelligent analog addressable smoke detectors with bases at locations shown on the Drawings or called for in the Specifications. Ionization type area smoke detectors are not permitted.
2. Smoke detectors shall operate on 24V D.C. received from the Fire Alarm Control Panel. Smoke detectors shall be analog type supervised by the panel for sensitivity rating within acceptable thresholds. Deviations shall be annunciated at the Fire Alarm Control Unit Remote Annunciator.
3. All smoke detectors shall be supplied with an LED indicator lamp, which shall give indication that the smoke detector is active (flash) and latch (on steady) when the detector has tripped into alarm.
4. Area type photoelectric smoke detector shall be compatible with Silent Knight 6700 panel or approved equal. Detectors shall comply with UL 268 7th edition and be UL listed for use with the FACU.

2.5 HEAT DETECTORS

1. Contractor shall provide heat detectors in storage room as shown on plans.
2. Heat detectors shall be 135°F compatible with FACU and shall be monitored with a monitor module. Detectors shall be UL listed for use with the FACU.

2.6 FIRE-ALARM NOTIFICATION APPLIANCES

A. Fire-Alarm Visual Notification Appliances (Strobes):

1. The rating of the strobe unit shall be a minimum of 15 candelas and shall deliver all characteristics and requirements called for in NFPA 72-10 and the American with Disabilities Act (ADA), including the “Equivalent Facilitation” rule, and UL 1971.
2. In corridors, places of assembly and common areas, the strobes shall be synchronized when 3 or more strobes are in line of sight. Strobes to be synchronized shall be UL listed for use with the FACP/power source to ensure synchronization.
3. Strobes shall be listed for wall-mounted application.
4. Strobes shall operate on 24 volts DC.
5. A translucent dome of hi-impact plastic, with the work "Fire" silk-screened red in 1/2" high letters, shall be provided to provide readability from both sides of the unit. The dome shall be screw-fastened or epoxied to plate so as to prevent dome from being removed.
6. Strobes and their wiring shall be 100% supervised by the Fire Alarm Control Panel.
7. In new construction, the indicator shall be mounted to a flush 1-gang or 4-inch square electrical box with suitably placed threaded holes to accept mounting of the device.
8. Strobes installed in damp, wet or exterior locations shall be provided with a weatherproof box and gasket listed for such application.
9. Strobes shall be compatible with Silent Knight 6700 or approved equal.

B. Fire-Alarm Audible/Visual Notification Appliances (Horn/Strobes):

1. The Contractor shall provide fire alarm horns wherever the Drawings require them.
2. Each horn shall be installed on a single gang or standard 4" galvanized electrical box, either flush or surface mounted, as indicated on Drawings. Provide weatherproof box and gasket in damp, wet or exterior locations.
3. Horns shall be electrically polarized and include a blocking network to allow for connection to a supervised fire alarm signal circuit.
4. Each horn shall have a high volume setting between 80 and 86 dBA at 10'-0”. Each horn shall have adjustable Hi-Lo dBA setting.
5. Horns shall be 24 VDC and shall have a selectable Temporal 3 setting to allow one pair of wires to power both horn and strobe.
6. All horns/strobes shall be by single supplier.
7. Where indicated on Drawings horns shall come equipped with a strobe unit that mounts directly to basic horn mechanism.
8. The strobe section and horn section shall be separate and can be connected to either separate signal circuit loops or to the same signal circuit loop.
9. Horns/strobe units red or white, 110 candela, to be synchronized and shall be UL listed for use with the FACP/power source to ensure synchronization.
10. Horn and strobe components of a horn/strobe unit shall meet all criteria listed above.

2.7 DIGITAL ALARM COMMUNICATOR TRANSMITTERS (DACTs)

A. Performance Criteria:

1. Regulatory Requirements:
   a. NFPA 72.
2. General Characteristics:
   a. DACT must be acceptable to remote central station and must be listed for fire-alarm use.
   b. Functional Performance: Unit must receive alarm, supervisory, or trouble signal from FACU and automatically dial preset number via cellular network or internet for remote central station. When contact is made with central station(s), signals must be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter must initiate local trouble signal and transmit signal indicating loss of telephone line to remote alarm receiving station over remaining line. Transmitter must automatically report telephone service restoration to central station. If service is lost on both telephone lines, transmitter must initiate local trouble signal.
   c. Local functions and display at DACT must include the following:
      1) Verification that both telephone lines are available.
      2) Programming device.
      3) LED display.
      4) Manual test report function and manual transmission clear indication.
      5) Communications failure with central station or FACU.
   d. Digital data transmission must include the following:
      1) Address of alarm-initiating device.
      2) Address of supervisory signal.
      3) Address of trouble-initiating device.
      4) Loss of ac supply.
      5) Loss of power.
      6) Low battery.
      7) Abnormal test signal.
      8) Communication failure.
   e. Secondary Power: Integral rechargeable battery and automatic charger.
   f. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup must be replaced.
2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.

B. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in normal path of egress within 60 inch of exit doorway.
2. Mount manual fire-alarm box on background of contrasting color.
3. Operable part of manual fire-alarm box must be between 42 and 48 inch above floor level. Devices must be mounted at same height unless otherwise indicated.

C. Smoke- and Heat-Detector Spacing:

1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with "Heat-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing must not exceed 30 ft.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A or Annex B in NFPA 72.
5. HVAC: Locate detectors not closer than 60 inch from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.

D. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

E. Audible Alarm-Indicating Devices: Install not less than 6 inch below ceiling. Install bells and horns on flush-mounted back boxes with device-operating mechanism concealed behind grille. Install devices at same height unless otherwise indicated.

F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inch below ceiling. Install devices at same height unless otherwise indicated.

G. Device Location-Indicating Lights: Locate in public space near device they monitor.

3.3 ELECTRICAL CONNECTIONS

A. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

C. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with black background and engraved white letters at least 1/2 inch high.

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.5 PATHWAYS

A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.

B. Pathways must be installed in EMT.

C. Exposed EMT must be painted red enamel.

3.6 CONNECTIONS

A. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.

3.7 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

B. Install framed instructions in location visible from FACU.

3.8 GROUNDING

A. Ground FACU and associated circuits in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Ground shielded cables at control panel location only. Insulate shield at device location.

3.9 FIELD QUALITY CONTROL

A. Field tests must be witnessed by the resident engineer/authorities having jurisdiction

B. Administrant for Tests and Inspections:

1. Owner will engage qualified testing agency to administer and perform tests and inspections.
2. Engage qualified testing agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.
   a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
   b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.
2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for public operating mode in accordance with manufacturer's written instructions. Perform test using portable sound-level meter complying with Type 2 requirements in ASA S1.4 Part 1/IEC 61672-1.
4. Test audible appliances for private operating mode in accordance with manufacturer's written instructions.
5. Test visible appliances for public operating mode in accordance with manufacturer's written instructions.
6. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. Provide video recording of training to Owner.

3.11 MAINTENANCE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service must include **12** months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections in accordance with "Visual Inspection Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in "Test Methods" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per "Testing Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.12 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement must include software support for two years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software must include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

END OF SECTION

SECTION 310000

EARTHWORK

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-In-Place Concrete: Section 033001.

B. Site Restoration: Section 310101.

C. Rock Removal: Section 312316.

D. Topsoil: Section 329120.

E. Seeding: Section 329219.

1.02 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.
   1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
   2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cu yd shall be classified as rock.
      a. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
      b. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
   3. Subgrade Surface: Surface upon which subbase or topsoil is placed.
   4. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
   5. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
   6. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at “Optimum Moisture Content” when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
   7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
   8. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.

9. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Director's Representative.
10. Grading Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line shall be considered the same.

1.03 SUBMITTALS

A. Product Data:
1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.

B. Samples: Submit samples as follows. Take the samples in the presence of the Director's Representative, and submit to the Directors Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:
1. Select Granular Material: 50 - 60 lb. (Two Samples).
2. Subbase Course Type 2: 50 - 60 lb. (Two Samples).
3. Selected Fill: 40 - 50 lb.
4. Cushion Material: 30 lb.
5. Crushed Stone: 30 lb
6. Pea Gravel: 40 – 50 lb.

C. Quality Control Submittals:
1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Director's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
3. Other Aggregates: Name and location of source and soil laboratory test results.

1.04 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements: When freezing temperatures are predicted, do not excavate to final required elevations for pipe, conduit or equipment requiring concrete work unless concrete can be placed immediately. Retain enough earth over the bottom elevation of excavations to prevent frost penetration.

C. Cold Weather Requirements:
1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Director's Representative and the following procedures shall be followed:
   a. Frozen ground shall be removed in its entirety from beneath and five feet beyond the area of fill placement.
   b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four inches in size. The material transported to the project site shall only consist of material excavated from below the frost depth.
   c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Director's Representative.
   d. Following work day, remove the insulated blankets and/or strip the area of all frozen material as specified previously.
   e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 PRODUCTS

2.01 MATERIALS

A. Select Granular Material: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	**Size opening (mm)**	
2 inch	50.8	100
1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.

2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

B. Subbase Course Type 2: Stockpiled, crushed ledge rock or approved blast furnace slag. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

C. Selected Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

D. Suitable Material (Fill and Backfill for Landscaped Areas): Material consisting of mineral soil (inorganic), blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof. Maximum particle size shall not exceed 2/3 of the specified layer thickness prior to compaction. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat shall be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.

E. Cushion Material: Shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances and shall meet the following gradation requirements:

Sieve Size		Percent Passing
Sieve Size	Size opening (mm)	
1/4 inch	6.35	100
No. 60	0.25	0-35
No. 100	0.15	0-10

F. Rip Rap: Fine, Light, Medium or Heavy Stone Filling that complies with DOT Article 620-2.02 for stone filling.

G. Pea Gravel: Comply with DOT Article 703-02 for screened gravel.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1/2 inch	12.7	100
1/4 inch	6.35	90-100
1/8 inch	3.17	0-15
No. 200 Sieve	0.075	0-1

H. Item B-12: Equal Blend of No.1 and No. 2 Crushed Stone that complies with material requirements of DOT Article 703-02, crushed stone only.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	95-100
½ inch	12.7	45-60
¼ inch	6.35	0-15

I. No. 1 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
1/2 inch	12.7	90-100
1/4 inch	6.35	0-15

J. No. 2 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	0-15

K. Marker Tape: FL Industries Blackburn/Holub's Type YT6, or Seton Nameplate Corporations Type 6 ELE, imprinted with message suited to item buried below.

2.02 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)
   1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
   2. Separation for foundation drains, underdrains, undercuts: GeoTex 801, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
   3. Separation/Stabilization beneath pavements: Amoco 4551, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

2.03 BRICK AND MORTAR

A. Manhole Brick: Standard size, ASTM C 32, Grade MS.

B. Mortar Materials: Dry packaged, proportioned for Type M unit masonry mortar, complying with ASTM C 387.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Clear and grub the site within the Grading Limit Line (GLL) of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.02 UNDERGROUND UTILITIES

A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.

B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.

C. Utilities to remain in service: Shall be re-routed as shown on the Contract Drawings.

D. Utilities abandoned beneath and five feet laterally beyond the structure's proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

E. Utilities located outside the limits specified above may be abandoned in place provided their ends are adequately plugged as described below.
   1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.
   2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
   3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

3.03 EXCAVATION

A. Excavate earth as required for the Work.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified on the Contract Drawings contact the Director's Representative.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).
   1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Director's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.

F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.

G. Concrete Slabs, Floors and Bases: Excavate to the following depths below bottom of concrete for addition of select granular material:
   1. Interior Floors: 6 inches unless otherwise indicated.
   2. Exterior Slabs and Steps: 12 inches unless otherwise indicated.

H. Pipe Trenches and/or Bell and Spigot Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 inches wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe.
1. Trench in Rock: Excavate an additional 6 inches below bottom of pipe for bed of cushion material under the piping.

I. Conduit, Cable, Tubing and Piping (other than Bell and Spigot): Provide sufficient trench width for installation and to accommodate special backfill when specified.

J. Underground Storage Tanks: Excavate as required to install tank and to accommodate special backfill.

K. Open Ditches: Cut ditches to cross sections and grades indicated.

L. Pavement: Excavate to subgrade surface elevation.

M. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Director.
1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls shall be reported immediately to the Director before any concrete or backfilling Work commences.

N. Notify the Director's Representative upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Director's Representative will be made on 3 working days notice.

3.04 DEWATERING

A. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

B. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

C. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

D. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.05 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional filter fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter fabric.

D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.06 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Remove all asphalt pavement in its entirety from areas requiring the placement of fill or break up old pavements to a maximum size of four inches. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.

B. Excavations: Backfill as promptly as practicable, but only after approval by the Director's Representative. Do not backfill with excavated material unless it meets the requirements of this Section.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.
   1. Place fill and backfill against foundation walls, and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum six inch thick (loose depth) layers.
   2. For Open Graded Stone/Clean Stone (Item B-12, No. 1 crushed stone, No. 2 crushed stone, etc.) in access of six inches: Material must be wrapped in separation fabric.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer. Place backfill against walls of structures containing basements or crawl spaces only after the first floor structural members are in place.

E. Under Exterior Concrete Slabs and Steps:
   1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.

2. Subbase Material: Place 12 inches of select granular material over subgrade surface.

F. Under Interior Concrete Slabs:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place six inches of select granular material over subgrade surface.

G. Under Pavements and Walks:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place as indicated.

H. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.

I. Plastic Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, 12 inches on both sides, and 12 inches above top of pipe. Complete balance of backfill as specified.

J. Copper Tubing and Steel Gas Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, six inches on both sides, and 4 inches over top of pipe. Complete balance of backfill as specified.

K. Rigid Non-Metallic Conduit: Except where concrete encasement is required, place cushion material a minimum of four inches deep under conduit, four inches on both sides, and 12 inches over top of conduit. Complete balance of backfill as specified.

3.07 COMPACTION

A. All materials with exception of open graded stone (No. 2 Coarse aggregate, No. 1 Coarse aggregate, Item B-12, etc.):
1. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than three percent drier or more than two percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).
a. Structures (entire area within ten feet outside perimeter): 95 percent.
b. Concrete Slabs and Steps: 95 percent.
c. Landscaped Areas: 90 percent.
d. Pavements and Walks: 95 percent.
e. Pipes and Tunnels: 95 percent.
f. Pipe Bedding: 95 percent.
2. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be re-compacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No

additional material may be placed over a compacted layer until the specified density is achieved

B. Open graded Stone: Place material in maximum twelve inch lifts. Each lift shall be raked smooth and compacted through several passes of a walk behind vibratory roller. Compaction Testing is **not** required.

3.08 GRADING

A. Rough Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of four inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:
1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
2. Walks and Pavements: Place and compact subbase material as specified. Shape surface of areas to required line, grade and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.
3. Building Slabs: Grade subbase material smooth and even, free of voids, compacted as specified to within 1/4 inch above or below required subbase elevation.

C. Spread approved topsoil directly upon prepared subgrade surface to a depth measuring 4 inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod. Place to greater depth when necessary to adjust grades to required elevations.
1. Approved existing topsoil within the Grading Limit Line may be used. Provide additional topsoil from outside sources as required.

D. Finish topsoil surface free of depressions which will trap water, free of stones over 1 inch in any dimension, and free of debris.

3.09 RESTORATION

A. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

B. Topsoil and seed or sod damaged lawn areas outside the GLL and new lawn areas inside the GLL. Water as required until physical completion of the Work.

3.10 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Remove from State property and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

B. Transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on State property designated by the Director's Representative, and dispose of such materials as directed.

3.11 FIELD QUALITY CONTROL

A. Compaction Testing: Notify the Director's Representative at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by the Director's Representative to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Director's Representative. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.12 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION

SECTION 311000 - SITE PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Protection of trees, shrubs and other vegetation
2. Clearing and grubbing of site
3. Implementation of soil erosion and sediment control procedures
4. Demolition and removal of existing site features
5. Disposal of waste materials

1.02 DESCRIPTION

A. Design Requirements

1. The Contractor shall clear and grub the site as required to perform the construction shown on the contract documents. Clearing and grubbing of the site shall be confined closely to the limits shown on the contract documents.
2. Site preparation operations required, but not limited to in the work, include:
   a. Protection of existing trees, shrubs and vegetation.
   b. Removal of existing trees, shrubs and vegetation as indicated on the contract documents.
   c. Clearing and grubbing.
   d. Transplanting and relocating of existing trees and shrubs as indicated on the contract documents.
   e. Temporary fencing.
   f. Topsoil stripping.
   g. Removal of above grade improvements and subsurface infrastructure.
   h. Disconnecting and removing all existing utilities except those designated to remain.
   i. Removal of debris.
   j. Dust control.

1.03 SEQUENCING AND SCHEDULING

A. Coordinate site preparation operations with the following:

1. Work with other prime contractors.
2. Shut down and relocation of site utilities in field of operations.
3. Various stages of completion in the project schedule.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine conditions under which site preparation work is to be accomplished in coordination with the installer components specified in this Section. Notify affected Prime Contractors, the Owner's Representative and the Architect in writing of any conditions detrimental to proper and timely accomplishment of the required work. Do not proceed with site preparation work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

1. When the Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to the Architect written confirmation from the applicable installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

B. Perform the following prior to starting site preparation work:

1. Inspect the entire project site including all objects that are designated to remain or to be removed.
2. Locate all underground infrastructure and utilities and determine requirement for their protection.
3. Preserve in operating condition all active utilities traversing the site and designated to remain.
4. Schedule site preparation work in consideration of adjacent public and private property owners.
5. Avoid interference with use of and passage to and from adjacent buildings and facilities.

3.02 PREPARATION

A. Protect existing objects designated to remain, both on and off the project site. In the event of damage, immediately make all repairs and replacements necessary for approval of the Owner's Representative and the Architect.

B. Prevent spread of dust during performance of the work throughout the life of the project. Thoroughly moisten all site areas as required to prevent dust from being a nuisance to the Owner, public, neighbors and performance of other work on the site.

C. Use all means necessary to minimize interference with roads, streets, walks, and other traveled areas. Do not close, obstruct, or cause to make impassable any traveled areas without first obtaining permission from the appropriate agencies.

D. Remove, relocate, store and protect from damage items designated to be savaged.

3.03 PROTECTION OF EXISTING TREES, SHRUBS AND VEGETATION

A. Install temporary fencing as required to protect existing trees, shrubs and other vegetation which are scheduled to remain from above ground damage including smothering of root systems. Do not store construction materials, debris or excavated materials within the drip line of trees. Restrict vehicular traffic, parking and pedestrian traffic from tree drip line areas to prevent excessive compaction of soil over root systems.

B. Trees, shrubs or vegetation scheduled to be saved that are damaged during construction work due to contractor negligence shall be placed under the care of a certified nurseryman or arborist. The Prime Contractor responsible for the damage to the plant material shall be liable for the cost of all required work. Trees, shrubs or vegetation that die as a result of contractor negligence shall be evaluated by a qualified nursery industry professional selected by the Owner's Representative. The removal and replacement of the affected trees, shrubs or vegetation and the associated evaluation expenses shall be the responsibility of the contractor.

3.04 CLEARING AND GRUBBING

A. Remove trees, shrubs and other vegetation that interfere with the installation of new construction or grading work, except for those indicated to remain. Use only hand methods for grubbing inside the drip line of trees indicated to remain. Removal of plant material includes the excavation and off-site disposal of new and old stumps of trees, shrubs and other vegetation and their entire root mass.

B. Depressions caused by clearing operations shall be filled with satisfactory soil material unless further excavation or earthwork is required.

3.05 IMPLEMENTATION OF SOIL EROSION AND SEDIMENT CONTROL PROCEDURES

A. Install temporary and permanent measures to mitigate soil erosion and sediment control issues as directed by the Architect or interested State Agencies. Work may include the installation of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, sloped drains and other erosion control devices.

B. The temporary soil erosion and sediment control measures indicated on the Contract Documents shall be coordinated with the specified permanent erosion control features to the extent practical to assure economical, effective and continuous erosion control.

3.06 DEMOLITION AND REMOVAL OF EXISTING SITE FEATURES

A. Remove foundations, pavement, sidewalks, curbs, retaining walls and other site features noted for removal that are encountered as part of the work.

1. Remove asphalt concrete paving material to full depth and remove from site.

2. Gravel and stone fill under removed sidewalks may be reused if suitable for the particular new use and approved by the Architect.
3. Remove below grade structures such as retaining walls to a minimum depth of 2'-0" below new finished grade unless specifically noted otherwise within the Contract Documents.
4. Break up and completely remove miscellaneous concrete such as small foundations.

B. Leave cut edge neat and square where existing material is cut to adjoin new work.

3.07 DISPOSAL OF WASTE MATERIALS

A. Burning on the Owner's property of combustible cleared and grubbed material is not permitted.

B. Remove all combustible cleared and grubbed material, excess excavated subgrade material, broken stone, broken concrete, masonry materials, and debris from the Owner's property and legally dispose of it. Obtain all permits for off-site disposal and submit a copy of each permit to the Owner's Representative.

END OF SECTION 311000

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SECTION 310001 - EARTHWORK– SITE WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and grubbing
B. Removal of topsoil
C. Underground utilities
D. Excavation
E. Dewatering
F. Settlement detection
G. Sheeting, shoring and bracing
H. Placing engineering fabric
I. Placing fill and backfill
J. Placing fill to support structures
K. Compaction
L. Rough grading
M. Subgrade surface for walks and pavement
N. Finish grading
O. Subgrade and base preparation for synthetic grass surfacing
P. Maintenance and restoration
Q. Disposal of excess and unstable materials
R. Field quality control
S. Protection

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 020500 – Reports On Exploration
B. Section 024113 – Selective Site Demolition
C. Section 133416 – Permanent Grandstand Bleachers
D. Section 311000 – Site Preparation
E. Section 312317 – Site Trenching
F. Section 312500 – Erosion and Sediment Control
G. Section 321216 – Asphalt Paving
H. Section 321313 – Concrete Paving
I. Section 321613 – Concrete Curbs
J. Section 321813 – Synthetic Grass Surfaces
K. Section 329200 – Turf and Grasses
L. Section 329223 – Sodding
M. Section 329300 – Exterior Plants
N. Section 331000 – Water Distribution Piping
O. Section 333000 – Sanitary Sewer System
P. Section 334100 – Storm Drainage System

1.03 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.

1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.5 cubic yards.
3. Materials which can be loosened with a pick or backhoe, frozen materials, soft laminated shale or hardpan, pavements, curbs, and similar materials shall be classified as earth excavation. Concrete building foundations and concrete slabs, where indicated, shall be classified as earth excavation. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
4. Unclassified Earth Excavation: The excavation and disposal of all surface and subsurface materials of any description necessary to perform the work of this contract. This shall include:

a. All soil deposits of any description both above and below groundwater levels. These may be naturally deposited or placed by previous construction operations.
b. Ledge rock of all quality. (Limestone, sandstone, shale, granite and similar materials in solid beds or masses in its original or stratified position which can only be removed by drilling, wedging, use of pneumatic tools or heavy ripping equipment.) Blasting operations will not be permitted to loosen any ledge rock necessary to be removed in this contract without prior written permission from the Architect and the Owner's Representative.
c. Boulders of any size.
d. Any materials of man-made origin.

5. Subgrade Surface: Surface upon which gravel base or topsoil is placed.
6. Base: Select granular material or base course Type 2 fill which is placed immediately beneath pavement or concrete slabs.
7. Fill: Placement of specified fill materials, in layers, above ground surface to required elevations.
8. Backfill: Placement of specified backfill material, in layers, in excavations to required subgrade elevations.
9. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
10. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
11. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
12. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
13. Unauthorized Excavation: The removal of material below required elevations indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Owner's Representative.

1.04 SUBMITTALS

A. Comply with requirements of Section 013300 - Submittal Procedures and as modified as below.

B. Shop Drawings:

1. Sheeting, Shoring, and Bracing (Shown on the Drawings): Submit shop drawings for sheeting, shoring, and bracing shown on the Drawings. Shop drawings shall be signed by a New York State licensed Professional Engineer.

C. Product Data:

1. Permanent Sheeting, Shoring, and Bracing: Specifications for materials and accessories.

D. Samples: Submit samples as follows. At the owner's discretion, take the samples in the presence of the Owner's Representative, and submit to the Owner's Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum, the samples taken shall be of the following quantities:

1. Select Granular Material: 40 - 50 lbs.
2. Type 2 Base Course: 40 - 50 lbs.
3. Drainage Fill: 40- 50 lbs, mixed to specification.
4. Synthetic Turf Dynamic Base: 40 - 50 lbs. of each required gradation.
5. Shot Put Area Mix: 10 – 20 lbs.
6. Long Jump/Triple Jump Pit Sand: 10 – 20 lbs.

E. Quality Control Submittals:

1. Base Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source, the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
2. Other Aggregates: Name and location of source and soil laboratory test results.
3. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Owner's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.

4. Sheeting, Shoring, and Bracing (Not shown on the Drawings): Submit a detailed plan of intended sheeting, shoring and bracing, signed by a New York State licensed Professional Engineer, for the Owner's information. This submittal will not relieve the Contractor of responsibility for the successful performance of the intended sheeting, shoring and bracing methods.
5. Soil Erosion and Sediment Control: Submit plan complying with the requirements of Section 312500.

F. Closeout Procedures: Comply with the requirements of Section 017700.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect filter fabric from sunlight during transportation and storage.

1.06 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements:

1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
2. Backfilling: If backfill is being placed during freezing temperatures, the backfilling operations shall be monitored by the Owner's Representative and the following procedures shall be followed:
   a. Frozen ground shall be removed in its entirety from beneath and five (5) feet beyond the area of fill placement.
   b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four (4) inches in size. The material transported to the project site shall only consist of material excavated from below the frost depth.
   c. At the end of the workday, the area of fill placement shall be covered with insulated blankets or left unprotected. Other means of protection (hay, wood chips etc.) may also be used for protection provided it is approved by the Owner's Representative.
   d. Following workday - Remove the insulated blankets and/or strip the area of all frozen material as specified previously.
   e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

C. Subsurface Information/Site Investigation Reports: Site investigation reports including soil boring logs and similar data included in the project documents are intended to represent only conditions found at locations indicated at time investigations were conducted. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or of continuity of such conditions. The Owner will not be responsible for interpretation or conclusions drawn by the contractor.

1. The Contractor may perform additional test borings and other exploratory operations at no additional cost to the Owner upon approval of the Architect.

D. Land Survey Information: Field verify provided existing boundary and topographic information prior to beginning site work. Immediately report any discrepancies in boundary locations or topographic elevations affecting site construction to the Owner's Representative. Provide profile information on existing site conditions and verification of existing topographic information to the Owner's Representative prior to beginning site construction. Beginning site work construction without this profile information and written notification indicates Contractor's acceptance of existing land survey data indicated on the drawings as accurate. Adjustments to the contract will not be made for discrepancies brought to the Owner's attention after site construction has begun.

PART 2 PRODUCTS

2.01 MATERIALS

A. Select Granular Material: Where indicated supply stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-10

B. Base Course Type 2 Crushed Stone: Where indicated supply stockpiled, crushed ledge rock or approved blast furnace slag. Comply with New York State Department of transportation gradation and material requirements modified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-7

C. Drainage Fill: Equal blend of No.1 and No. 2 washed crushed or uncrushed stone.

1. No. 1 Coarse Aggregate:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
½ inch	12.7	90-100
¼ inch	6.35	0-15

2. No. 2 Coarse Aggregate:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	90-100
½ inch	12.7	0-15

D. Rip Rap: Fine, Light, Medium or Heavy Stone Filling that complies with DOT Article 620-2.02 for stone filling and Figure 620-1 Stone Filling Gradation Requirements.

Medium Stone	
Size Designation	% Mixture by Weight
Heavier than 100 lbs.	50 – 100%
Smaller than 6”	0 – 10%

E. Dynamic Base for Synthetic Grass Surfacing: refer to Section 321813for additional information.

Sieve		Percent Passing	
Sieve Size	Sieve Size (mm)	Base Stone	Finishing Stone
2 inch	50.8	100	
1 ½ inch	38.1	90-100	
1 inch	25.4	75-100	
¾ inch	19.05	65-95	
½ inch	12.7	55-85	100

3/8 inch	9.53	40-75	85-100
¼ inch	6.35	25-65	75-100
No. 4 Sieve	4.76	15-60	60-90
No. 8 Sieve	2.38	0-40	35-75
No. 16 Sieve	1.191	0-20	10-55
No. 30 Sieve	0.594	0-7	0-40
No. 60 Sieve	0.249	0-5	0-15
No. 100 Sieve	0.150	0-3	0-8
No. 200 Sieve	0.075	0-2	0-2

1. Restrictions

   a. To Ensure structural Stability: $D_{60}/D_{10} > 5$ and $1 < D^2_{30}/D_{10}\ D_{60} < 3$. Fragmentation must be 100 percent.

   b. To Ensure Separation Of Both Stones: D_{85} of finishing stone / D_{15} of base stone > 2 and 3 < D_{50} of base stone / D_{50} of finishing stone < 6

   c. To Ensure Proper Drainage:

      1) Permeability of base stone > 500 in/hr (3.5×10^{-1} cm/sec)
      2) Permeability of finishing stone > 20 in/hr (1.4×10^{-2} cm/sec)
      3) Porosity of both stones > 25% (When stone is saturated & compacted to 95% Proctor.
      4) "D_x" in preceding subparagraphs = Size of sieve (in mm) that lets pass x percent of stone. For example, D_{60} = size of sieve that lets 60 percent of stone pass. For calculation purposes, sizes may be obtained by interpolation on semi-log graph of sieve analysis.

   d. Depending on type of rock present in crushed stone mix, other mechanical characteristics may be necessary for approval.

   e. Where field supports heavy vehicles, give consideration for load bearing requirements of base.

F. Engineering Fabric: Fabric composed of high tenacity polypropylene yarns woven into a stable network. The fabric is to be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids complying with the following mechanical and physical properties:

Mechanical Properties	Test Method	Unit	Minimum. Average Roll Value
Grab Tensile Strength	ASTM D 4632	kN (lbs)	MD 1.4 (315)/ CD 1.4 (315)
Grab Tensile Elongation	ASTM D 4632	%	MD 15/CD 15
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	MD 0.534 (120)/CD 0.534 (120)
Puncture Strength	ASTM D 4833	kN (lbs)	4.005 (900)
Apparent Opening Size (AOS)	ASTM D 4751	mm (US Sieve)	0.425 (40)
Permittivity	ASTM D 4491	sec^{-1}	0.05
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	163 (4.0)
UV Resistance (at 500 Hours)	ASTM D 4355	% strength retained	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m^2 (oz/ydm^2)	203 (6.0)
Thickness	ASTM D 5199	mm (mils)	0.6 (25)
Roll Dimensions (Width X Length)	-----	m (ft)	3.8 X 110 or 5.3 X 78.7 (12.5 X 360) or (17.5 X 258)
Roll Area	-----	m2 (yd2)	418 (500)
Estimated Roll Weight	-----	kg (lb)	109 (240)

1. Manufacturer: For convenience, details have been based on Mirafi 600X as manufactured by Ten Cate/Mirafi, Pendergrast, GA (Tel. #706-693-2226).

G. Engineering Fabric for Synthetic Grass Surface and Separation: Non-woven geotextile fabric composed of polypropylene fibers formed into a stable network such that the fibers retain their relative position. The fabric is to be inert to biological degradation, resisting naturally encountered chemicals, alkalis and acids complying with the following mechanical and physical properties:

Mechanical Properties	Test Method	Unit	Minimum. Average Roll Value
Grab Tensile Strength	ASTM D 4632-91	kN (lbs)	MD 0.71 (160)/ CD 0.71 (160)
Grab Tensile Elongation	ASTM D 4632-91	%	MD 50/CD 50
Trapezoid Tear Strength	ASTM D 4533-91	kN (lbs)	MD 0.27 (60)/CD 0.27 (60)
CBR Puncture Strength	ASTM D 6241	kN (lbs)	4.10 (1825)
Apparent Opening Size (AOS)	ASTM D 4751-99A	mm (US Sieve)	0.212 (70)
Permittivity	ASTM D 4491-99A	sec^{-1}	1.5
Flow Rate	ASTM D 4491-99A	$l/min/m^2$ ($gal/min/ft^2$)	4481 (110)
UV Resistance (at 500 Hours)	ASTM D 4355-02	% strength retained	80

1. Manufacturer: For convenience, details have been based on Mirafi 160N as manufactured by Ten Cate/Mirafi, Pendergrast, GA (Tel. #706-693-2226).

H. Shot Put Area Mix: Hard, durable, bluestone particles totally free of stone, lumps of clay and all deleterious substances complying with the following gradations:

Sieve		Percent Passing By Weight
Sieve Size	Size opening (mm)	
¼ inch	6.35	100
No. 10	1.70	50-85
No. 40	0.425	20-45
No. 200	0.075	3-10

I. Long Jump/Triple Jump Mix: Sand sized mineral product complying with the following visual characteristics and physical properties:

1. Material: For convenience, details have been based on Best Tour Grade 535 Bunker Sand by Weaver Golf and Sports Turf Solutions, Jamestown, NY (Tel. #888-932-8370).
2. Color: Off-white.
3. Sphericity: Medium.
4. Angularity: Sub-angular.
5. Geometric Mean Particle Diameter (GMD): 0.57
6. Coefficient of Uniformity (Cu): 1.82
7. Gradation Index (GI): 2.76

Cate/Mirafi, Pendergrast, GA (Tel. #706-693-2226).

J. Sand (trench backfill): Concrete sand conforming to NYSDOT Standard Specification Section 703-07.

K. Washed Pea Gravel: Stone conforming to NYSDOT Standard Specifications for No. 1 (Table 703-4), washed, and rounded.

2.02 SHEETING, SHORING, AND BRACING

A. Steel Sheet piling: Continuous interlock type complete with all required accessories, complying with ASTM A 328 or ASTM A 572.

1. Furnish steel sheet piling of design, configuration, and length to resist pressure of earth to be retained.

B. Timber Sheeting, Shoring, and Bracing: Structural grade timber or lumber uprights, wales, and cross braces of sufficient dimension to resist pressure of earth to be retained.

1. Timber and lumber used for permanent sheeting shall be pressure creosoted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine conditions under which earthwork is to be accomplished in coordination with the installer of materials and components specified in this Section and notify affected Prime Contractors, Owner's Representative and the Architect in writing of any conditions detrimental to proper and timely accomplishment. Do not proceed with earthwork until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

1. When the Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to the Architect written confirmation from the applicable installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Protection

1. Use of explosives: Do not bring explosives onto the site or use in the project without prior written permission from the Architect and the Owner's Representative. The Contractor remains solely responsible for the handling, storage and use of explosive materials when permitted. Use explosives in strict compliance with State, Local and OSHA regulations.

2. Protection of Persons and Property

a. Barricade open excavations and post with warning lights for safety of persons. Operate warning lights during hours from dusk to dawn each day.
b. Protect structures, utilities, sidewalks, pavements and other facilities immediately adjacent to excavations from damage caused by settlement, lateral movement, undermining, washout and other hazards.
c. Take precautions and provide necessary bracing and shoring to guard against movement and settlement of existing improvements or new construction. Contractor remains entirely responsible for strength and adequacy of bracing and shoring, and for safety and support of construction from damage or injury caused by lack of adequate protection or by movement or settlement.

3.03 CLEARING AND GRUBBING

A. Clear and grub the site within the grading limit lines of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

1. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
2. Where roots and branches of trees indicated to be saved interfere with new construction, carefully and cleanly cut them back to point of branching.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.04 REMOVAL OF TOPSOIL

A. Remove existing topsoil from areas within the grading limit lines where excavation or fill is required.

B. Stockpile approved topsoil where directed until required for use. Place, grade, and shape stockpiles for proper drainage.

1. Topsoil shall be tested prior to stockpiling. Stockpile only quantities of topsoil approved in writing for re-use.

3.05 UNDERGROUND UTILITIES

A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.

B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.

C. Utilities to remain in service shall be re-routed as shown on the Contract Drawings.

D. Utilities abandoned beneath and five (5) feet laterally beyond a structure's proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

E. Unless otherwise noted in the Contract Documents, utilities extending outside the limit specified above (5 feet) may be abandoned in place provided their ends are adequately plugged as described below.

1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.
2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

F. Coordinate with other Prime Contractors or with local utility companies, as applicable, for shutoff service if lines are active.

G. Coordinate scheduling of removal to accommodate relocation of lines when necessary.

H. Demolish and remove or relocate additional uncharted underground utilities conflicting with construction operations as directed by the Architect. Measure additional removal and relocations as directed by the Architect and paid for by the Owner as a Change Order.

3.06 EXCAVATION

A. Excavate earth as required for the work. Remove and dispose of all materials encountered to obtain required subgrade elevations. Remove from property and legally dispose of all excess fill material.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified in Section 312500, on the Contract Drawings or as directed by local officials.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).

1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage as approved by the Owner's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the work.

F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.

1. Stepping Footings: Cut sloping surfaces under footings, foundations, steps, and where required for other work as indicated.
2. Pile Foundations: Stop excavations 6 to 12 inches above the bottom of pile cap elevation before the piles are placed. After pile installation, remove loose and displaced material and excavate to final grade, leaving a solid base to receive concrete pile caps.
3. Where footings and other work requiring similar soil support will rest entirely on rock, remove loose soil and loose rock and place concrete to the required elevations. Where footings and other work requiring similar soil support will rest partially on rock and partially on soil, immediately notify the

Owner's Representative before any backfilling or concrete placement occurs; the Owner's Representative will determine the correct foundation treatment for the work.

G. Slabs: Excavate to the following depths below bottom of concrete for addition of select granular material:

1. Exterior Slabs and Steps: 12 inches unless otherwise indicated.

H. Pipe Trenches: Refer to Section 312317.

I. Open Ditches: Cut ditches to cross sections and grades indicated.

J. Pavement: Excavate to subgrade surface elevation.

K. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Owner's Representative.

1. Unauthorized excavations under structural work such as footings, foundation bases, and retaining walls shall be reported immediately to the Owner's Representative before any concrete or backfilling work commences.

L. Notify the Owner's Representative upon completion of excavation operations. Do not proceed with the work until the excavation is inspected and approved.

M. Removal of Unsuitable Material Beneath Structures and Other Improvements: Excavate encountered unsuitable materials, which extend below required elevations, to additional depth as directed by the Owner's Representative. Have cross sections taken, under the supervision of an independent Land Surveyor, to determine the quantity of such excavation. Do not backfill this excavation prior to quantity measurement.

1. Such additional excavation and backfilling, not due to error, fault or neglect of the Contractor and exceeding the numeric quantities indicated on the Drawings, will be paid for at a pre-negotiated or pre-established unit price by Change Order.

3.07 ROCK EXCAVATION & BLASTING

A. Rock Excavation: Consists of the removal and disposal of materials encountered that cannot be excavated with a 1 ½ cubic yard capacity power shovel without drilling and blasting, or requiring use of specialized equipment.

1. Typical Rock Classified Materials: Boulders 1 ½ cubic yards or more in volume, solid rock, rock in ledges, and rock hard cementitious aggregate deposits.

a. The Contractor shall classify intermittent drilling or ripping performed to increase production and not necessary to permit excavation of material encountered as earth excavation.

2. Rock payment lines shall be limited to the following:

a. Two feet outside of concrete work for which forms are required, except footings.
b. One foot outside of perimeter footings.
c. In pipe trenches, six inches below invert elevations of pipes and two feet wider than the inside diameter of the pipe, but not less than three-foot minimum trench width.
d. Neat outside dimensions of concrete work where no forms are required.
e. Under slabs on grade, six inches below bottom of concrete slab.

B. Blasting: Perform blasting operations using skilled personnel, in compliance with governing regulations. Comply with ANSI A10.1 "Safety Code for Building Construction".

1. Store explosives, if permitted on the Owner's property, only where directed by the Owner's Representative and in proper storage structures. Keep storage facilities securely locked at all times for inspection and for delivery and storage of explosives. Provide full time watchman and other controls as required by governing regulations.

2. Conduct blasting operations using explosives of such quantity and power, and fired in such sequence and locations, to avoid injury to personnel or damage to property or adjacent construction. Assume full responsibility for damages resulting from or attributable to blasting operations.

3.08 DEWATERING

A. Refer to subsurface logs included in the Contract Documents for information regarding subsurface conditions. The Owner shall not be liable for Change Orders resulting from the Contractor's inability to properly dewater the site.

B. Prior to the performance of any excavations provide dewatering methods such that the groundwater table is maintained at an elevation that is beneath the excavated depth.

C. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

D. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

E. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

F. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.09 SETTLEMENT DETECTION

A. Excavating beneath the bearing grades of an existing structure: Establish a settlement detection method approved by the Owner's Representative for structures subject to settlement from excavation, sheeting or sheet piling operations. Maintain surveillance to detect any settlement.

B. Surcharging: Establish a settlement monitoring plan to accurately determine the settlements that have occurred and the rate that they occurred to adequately determine when settlement caused by surcharge is complete.

3.10 SHEETING, SHORING, AND BRACING

A. Temporary Sheeting: Install temporary sheeting (or sheet piling) with shoring and bracing as required to create a safe working environment and prevent settlement or other damage to adjacent grounds and structures resulting from excavation operations. Shore and brace sheeting in a manner which will not interfere with progress of other work or related contracts (if any) on this project. Check shoring and bracing for settlement and adjust for settlement. Promptly remove temporary sheeting, shoring, and bracing when no longer required.

B. Permanent Sheeting: Install permanent steel sheet piling or timber sheeting where shown. Cut off top of permanent sheeting 12 inches below finish grade.

3.11 PLACING ENGINEERING FABRIC

A. Place and overlap engineering fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional engineering fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on engineering fabric.

D. Backfill immediately over engineering fabric. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.12 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Refer to Section 311000 – Site Preparation for additional information.

1. Remove all asphalt pavement in its entirety from areas requiring the placement of fill.
2. After topsoil is stripped and other improvements specifically indicated to be removed on the Contract Documents are removed, proof roll the site with a ten-ton vibratory compactor (minimum six overlapping passes required) or similar equipment. Excavate soft or loose soils identified during rolling and replace with properly compacted select granular material as directed by the Owner's Representative or the Project Designer. Measure additional excavation and backfill as directed by the Owner's Representative or the Project Designer and paid for by the Owner as a Change Order.
3. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill materials bond with the existing surface.

B. Excavations: Backfill as promptly as work permits, but not until completion of the following:

1. Acceptance by the Owner's Representative of construction below finish grade including, where applicable, damp proofing, waterproofing, perimeter insulation, and bearing capacity of supporting soil.
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of temporary sheeting (or sheet piling) and backfilling of voids caused by removals.
5. Cutting off top of permanent sheeting (or sheet piling).
6. Removal of trash and debris.
7. Installation of permanent or temporary bracing on horizontally supported walls.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.

1. Place fill and backfill against foundation walls and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum 6-inch thick (loose depth) layers.
2. For large fill areas, the layer thickness may be modified by the Owner's Representative, at the Contractor's written request, if in the Owner's Representative's judgment, the equipment used is capable of compacting the fill material in a greater layer thickness. This request shall include the type and specifications of compaction equipment intended for use.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer. Place backfill against walls of structures containing basements or crawl spaces only after the first floor structural members are in place.

E. Under exterior concrete slabs and steps, utilize the following fill materials:

1. Select granular material from subgrade to within 6" of the concrete slab or steps.
2. Select Type 2 crushed stone for the next 6".

F. Against dampproofed or waterproofed structure faces or structure faces with foundation drains, utilize select granular material.

G. Under Pavements and Walks:

1. Utilize select Type 2 crushed stone as indicated on the construction drawings and in the applicable specification sections in the Project Manual.

H. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over 4 inches in diameter within the top 12 inches of suitable material.

3.13 ADDITIONAL REQUIREMENTS FOR PLACING FILL TO SUPPORT STRUCTURES

A. Place fill at the perimeter of the structure to be constructed as follows:

1. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.

2. Compact the stripped surface to 95 percent of maximum density.
3. Place fill in horizontal layers not exceeding 8 inches loose depth and compact layers as specified.

B. Place fill within the perimeter of the structure to be constructed as follows:

1. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.
2. Proof roll the stripped surface with at least 5 passes of a vibratory drum compactor having a minimum unsprung drum weight of 7 tons unless specifically indicated otherwise in the Contract Documents. Notify the Owner's Representative of the proposed date for beginning proof rolling at least 2 working days prior to commencing proof rolling.
3. Excavate unsuitable materials (soft and unstable earth) disclosed by the proof rolling operation and replace with compacted selected granular material.
4. Place fill in horizontal layers not exceeding 8 inches loose depth and compact layers as specified.

C. Obtain written approval of fill area compaction before excavating for footing.

D. Excavate for footing width plus 1 foot on each side.

E. Excavate 1 foot below footing elevations where bottom of footings are 2 feet or less above or 4 feet or less below original ground surface.

1. Compact footing bottom and place a 1 foot bed of select granular material. Compact select granular material in 6 inch layers.
2. Omit excavation and select granular material below bottom of footings where footing elevations are more than 2 feet above or more than 4 feet below original ground surface.

3.14 COMPACTION

A. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than 3 percent drier or more than 2 percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or ASTM D 1557 (Modified Proctor).

1. Structures (entire area within 10 feet outside perimeter): Compact subgrade and each layer of backfill or fill material to 95 percent.
2. Concrete Slabs and Steps: Compact subgrade and each layer of backfill or fill material to 95 percent.
3. Landscaped Areas: Compact the top 2'-0" to a maximum of 85% and compact all subgrade areas beneath the upper 2'-0" to 95%.
4. Natural Turf Athletic Fields: Compact the top 2'-0" to a maximum of 85% and compact all subgrade areas beneath the upper 2'-0" to 95%.
5. Synthetic Turf Playfields: Compact subgrade and each layer of backfill or fill material to 95 percent.
6. Pavements and Walks: Compact subgrade and each layer of backfill or fill material to 95 percent.
7. Pipes and Tunnels: Compact subgrade and each layer of backfill or fill material to 95 percent.
8. Pipe Bedding: Compact subgrade and each layer of backfill or fill material to 95 percent.

B. Compaction Equipment:

1. Provide compaction equipment of suitable size and number and in satisfactory working condition to complete construction on schedule.
2. Use sheepsfoot rollers, pneumatic tired rollers, vibrating tampers, or other compaction equipment capable of obtaining required density throughout the entire layer being compacted.

C. When the existing ground surface to be compacted has a density less than that specified for the particular area classification, break up and pulverize, and moisture condition to facilitate compaction to the required percentage of maximum density.

D. Moisture Control:

1. Where fill or backfill must be moisture conditioned before compaction, uniformly apply water to the surface and to each layer of fill or backfill. Prevent ponding or other free water on surface subsequent to, and during compaction operations.
2. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and

allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

E. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be recompacted and retested. If compaction cannot be achieved the material/layer shall be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.

3.15 ROUGH GRADING

A. Interior Grading: Trim unexcavated spaces within the building to levels indicated.

1. Subgrade for Interior Slabs: Compact as specified to receive fill material. Finish subgrade surface within 1 inch above or below level specified for fill required.

B. Exterior Grading: Trim and grade area within the grading limits of the Contract Documents and excavations outside the limits, required by this Contract, to a level of 6 inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide a smooth uniform transition to adjacent areas.

1. Grade areas outside building lines for each structure to drain away from structures and to prevent ponding of water. Finish surfaces free from irregular surface changes, large stones.
2. Landscaped Areas: Provide uniform subgrade surface within 1 inch of required level to receive topsoil thickness specified. Compact fill as specified to within 2 inches of subgrade surface. Remove objectionable material detrimental to proper compaction or to placing full depth of topsoil. If the top 4 inches of subgrade has become compacted before placement of topsoil, harrow or otherwise loosen rough graded surface to receive topsoil to a depth of 4 inches immediately prior to placing topsoil.

3.16 SUBGRADE SURFACE FOR WALKS AND PAVEMENT

A. Shape and grade subgrade surface as follows:

1. Walks: Shape the surface of areas under walks to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subgrade surface elevation.
2. Pavements: Shape the surface of areas under pavement to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subgrade surface elevation.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Thoroughly compact subgrade surface for walks and pavement by mechanical rolling, tamping, or with vibratory equipment as approved to the density specified.

D. Shoulders: Place shoulders along edges of filled subgrades to prevent lateral movement. Construct shoulders of specified fill material, placed in such quantity to compact to thickness of each subgrade course layer. Compact and roll at least a 1’-0” wide additional layer of each subgrade course.

3.17 FINISH GRADING

A. Uniformly grade rough graded areas within the grading limits to finish grade elevations indicated.

B. Grade and compact to smooth finished surface within tolerances specified, and to uniform levels or slopes between points where finish elevations are indicated or between such points and existing finished grade.

C. Grade areas adjacent to building lines so as to drain away from structures and to prevent ponding.

D. Finish surfaces free from irregular surface changes, and as follows:

1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
2. Walks: Place and compact base material as specified. Shape surface of areas under walks to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subbase elevation.

3. Pavements: Place and compact base material as specified. Shape surface of areas under pavement to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subbase elevation.
4. Building Slabs: Grade base material smooth and even, free of voids, compacted as specified, and to required subbase elevation. Finish final grades within a tolerance of ¼ inch when tested with a 10 foot straightedge.
5. Surfaces To Receive Vapor Barrier: Provide smooth surfaces graded, tamped and/or rolled, entirely free of obstructions or protruding objects.

E. Spread topsoil directly upon prepared subgrade surface to a depth measuring a minimum of 6 inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod unless specifically indicated otherwise within the Contract Documents. Place to greater depth when necessary to adjust grades to required elevations.

1. Only approved existing topsoil within the grading limits may be used. Provide additional topsoil from outside sources as required.

F. Finish topsoil surface free of depressions which will trap water, free of stones over ½ inch in any dimension, and free of debris.

3.18 SUBGRADE & BASE PREPARATION FOR SYNTHETIC GRASS SURFACING

A. Subgrade Preparation

1. Establish a single benchmark prior to excavation and maintain by a licensed surveyor of record during the entire subgrade preparation and dynamic base installation construction process.
2. Remove all topsoil, organic, deleterious or non-compactable materials. Excavate playfield area to the depth indicated on the Contract Documents.
3. Grade playfield area to minimum 0.5% or more slope from longitudinal center of the field towards the sidelines.
4. Compact the soil bed in a minimum of two directions to attain minimum 95% standard proctor compaction rate unless specifically noted otherwise within the Contract Documents.
5. Laser grade subgrade to tolerances of not more than ¼” in 10’ from required elevation to allow for even drainage flow.
6. Excavate perimeter drainage collector trenches to the elevation and profile as indicated on the Contract Documents. All loose debris shall be removed from the trenches prior to pipe installation. Trenches shall be backfilled with specified drainage fill material compacted by hand tamping or similar mechanical means to a minimum 95% of standard proctor maximum density.
7. Install engineering fabric to cover subgrade as detailed on the drawings. Place fabric in accordance with the “Placing Engineering Fabric” paragraph above.

B. Composite Drain Installation

1. Prior to composite drain installation, ensure subgrade surface is uniform, free of rocks, depression, voids and irregularities.
2. Refer to Section 321813 for composite drain specifications.

C. Stone Base Installation

1. Provide and install a minimum four-inch layer of specified uniformly mixed stone base without damaging the composite drain system and engineering fabric or forming depressions in the subgrade below.
2. If required compacted stone base exceeds 6” in depth, construct base in two or more layers or lifts of approximate equal thickness. Each layer shall be compacted in minimum two directions to attain required compaction rate.
3. Laser grade stone base at 0.5% from the center longitudinal axis of the playfield towards the sidelines or as specified on the Contract Documents. Ensure elevations of the stone base do not vary from the specified grade by more than ¼” in ten feet in any direction.
4. Place specified finishing stone layer no more than 2” thick and laser grade at 0.5% from the center longitudinal axis of the playfield towards the sidelines or as specified on the Contract Documents. Compact finishing stone in minimum two directions to attain required compaction rate. Ensure that elevations of the stone base do not vary from the specified grade by more than ¼” in ten feet in any direction over the entire playfield area.

5. Mark areas that deviate from the required elevations with spray paint. Correct grade with additional finishing stone rolled tight to comply with required compaction densities.
6. Surface of synthetic turf stone base shall be maintained so as to be well drained at all times, standing water is not permitted.

D. Testing and Survey Verification of Dynamic Base

1. Provide gradation testing for all stone base layers prior to installation. Submit test results to the Architect and the Synthetic Turf Installer for joint approval of the product.
2. Independently confirm compliance with specified tolerances, planarity and elevation of the playfield subgrade and base elevations to be verified by a licensed surveyor and compaction, gradation and permeability verified by a Geotechnical Engineer.
3. Permeability: The contractor shall verify permeability of aggregate using DIN 8035 Part 7 (preferred method), ASTM 2434 (constant head), or ASTM D3385 (double ring) testing methods. Take a minimum of one sample per 5000 square feet unless otherwise directed by the Architect.
4. Topographical Survey: A professional land surveyor shall prepare a topographical survey with shots on a ten-foot square grid, a minimum of 72 hours prior to the start of the synthetic turf surfacing installation. The survey shall be submitted to the Owner's Representative and the Project Designer for evaluation for acceptable planarity and tolerance.

    a. In the event that the synthetic turf base as constructed does not meet the specified requirements, make all necessary repairs within 24 hours to avoid delay in installation of the synthetic grass surfacing.
    b. Coordinate with synthetic grass surfacing installer to ensure synthetic grass installers equipment can run smoothly upon installed granular base without sinking or in any other way disturbing the sub base and base layers.
    c. When directed by the Owner's Representative or the Architect, upon the request of the synthetic grass surfacing installer, the contractor shall provide a porosity report prior to the installation of the synthetic grass surfacing.

3.19 MAINTENANCE AND RESTORATION

A. Restore grades to indicated levels where settlement or damage due to performance of the work has occurred. Correct conditions contributing to settlement. Remove and replace improperly placed or poorly compacted fill materials.

B. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

C. Topsoil and seed or sod damaged lawn areas inside and outside the indicated grading limits. Water as required until lawn areas are accepted by the Owner's Representative.

3.20 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Remove from the work site and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

B. If acceptable to the Owner's Representative, transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on the project site designated by the Owner's Representative, and dispose of such materials as directed.

C. Transport excess topsoil to areas on the project site designated by the Owner's Representative. Smooth grade deposited topsoil.

3.21 FIELD QUALITY CONTROL

A. Tests: The Owner may provide soil testing and inspection services during earthwork operations. The Owner reserves the right to test and approve all subgrades and fill layers before construction proceeds. Refer to Section 014000 – Quality Control for additional requirements relating to testing.

1. Compaction Testing: Provide the Owner's Representative adequate notice for all phases of filling and backfilling operations. Compaction testing will be performed by the Owner's Testing Agency to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Owner's Representative and the Testing

Agency. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be recompacted and retested. No additional material may be placed over a compacted layer until the specified density is achieved.

2. Tests of subgrades and fill layers may, at the Owner's option, include:

    a. Observation of proof rolling procedures.
    b. Observation and or inspection of unsuitable soil material.
    c. Footing subgrades, for each strata of soil for which footings will be placed, at least one plate bearing test and field density test may be conducted if the subgrade is non-cohesive, or unconfined compression test may be conducted if the subgrade is cohesive, to verify design bearing capacities shown on the drawings. Subsequent verification and approval of each footing subgrade may be based on visual comparison of each subgrade with tested strata when acceptable to the Project Designer.
    d. Paved areas and building subgrade areas, at least one field density test of subgrade for every 2000 square feet of paved area or building slab, but not less than three tests may be made. In addition, in each compacted fill layer, at least one field density test of subgrade for every 2000 square feet of paved area or building slab, but not less than three tests may be made.
    e. Foundation wall backfill, field density tests at locations and elevations as directed may be made, with at least one test made for every 50 feet of wall.
    f. Fill under footings, in each compacted fill layer; one compaction test for every 30 LF of wall may be taken. One compaction test may be made under each individual footing.
    g. Fill under natural turf playfields, at least one field density test of subgrade for every 2000 square feet of playfield area, but not less than three tests may be made. In addition, in each compacted fill layer, at least one field density test of subgrade for every 2000 square feet of overlaying playfield, but not less than three tests may be made.

3. If in the opinion of the Architect and based on reports of the testing service, completed subgrades or fills are below the specified density, provide additional compaction and testing at no additional expense to the Owner.

3.22 PROTECTION

A. Protect graded areas from traffic and erosion and keep them free of trash and debris.

B. Repair and re-establish grades and seeding in settled and rutted areas to specified tolerances.

END OF SECTION 311001

SECTION 312317 - SITE TRENCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Trench excavation, backfill and compaction of underground piping and underdrainage.

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 331000 – Water Distribution Piping
C. Section 333000 - Sanitary Sewer System
D. Section 334100 – Storm Drainage System

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Backfill Product Data: Submit test reports for each type of gravel and/or stone specified for backfill naming the source of each material. Submit evidence that each backfill material complies with Department of Transportation standard specifications for the materials specified.

C. Quality Control Submittals

1. Experience Listing: Submit a list of completed projects similar to this project, including owner's contact information and telephone number for each project.

D. Closeout Procedures: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.05 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.06 SEQUENCING AND SCHEDULING

A. Proceed with and complete trenching operations as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Excavated Material: Utilize on-site excavated materials consisting of loam, clay, sand, gravel or other material suitable for backfilling as approved by the Project Designer when the type of backfill material is not indicated on the Contract Documents.

B. Sand: Natural bank sand complying with the following gradation requirements:

1. 100% passing the ¾" sieve
2. Less than 5% passing the Number 200 sieve.

C. Select Granular Material: Where indicated supply stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-10

D. Bedding Material: Mixture of 50% No. 1 and 50% No. 2 stone complying with the following New York State Department of Transportation Standard Specifications:

No. 1 Stone Gradation Requirements

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
1/2 inch	12.70	90-100
1/4 inch	6.35	0-15
No. 200	0.075	0-1

No. 2 Stone Gradation Requirements

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 ½ inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	30-65
No. 200	0.075	0-10

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which trenching operations are to occur with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 EXCAVATION

A. Excavate trenches to line and depth as indicated on the Contract Documents. Provide consistent, uniform support for the bottom quadrant of each section of piping, fittings and associated materials.

1. Excavate no more than length of trench that can receive infrastructure installation and backfill.
2. Brace and drain trenches as required. Accumulations of groundwater or storm runoff shall be immediately discharged by dewatering pumps to siltation basins or protected channels, drains or storms sewers.
3. Provide adequate trench width to permit successful laying and joining of pipe, proper placement of backfill and clearance of at least 8" on either side of the pipe barrel.
4. Prepare the finish grade of the trench bottom with hand tools. Where elevations are not shown on the Contract Documents, excavate the trench to place a minimum of 18" of fill above the top of the pipe. Provide "bell holes" at each pipe joint for proper joining to eliminate point bearing. Stones of 2" or greater in any dimension or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.
5. Where trench excavation is carried below the specified elevation as a result of Contractor error or negligence, backfill the trench with Select Granular Material and compact to required densities at no cost to the Owner.

6. When trenching is required within the dripline of trees, tunnel under or around roots by hand digging. Do not cut tap roots or main lateral roots.

B. Rock Excavation: Comply with the requirements outline in Project Manual Section 02300- Earthwork.

C. Excavated Materials

1. Materials satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides and cave-ins.
2. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes and other approved methods.
3. Stockpiles shall be protected from contamination with unsatisfactory excavated material or other material that destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on site or imported materials from approved sources at no additional cost to the Owner.
4. Excavated material not required or not satisfactory for backfill shall be removed from the site.

3.03 BACKFILLING

A. Trench Backfill: Trenches shall be backfilled to grade upon completion of required testing work.

B. Bedding and Initial Backfill: Bedding shall be of the type and thickness as indicated on the Contract Documents or as recommended by the pipe manufacturer.

1. Initial backfill material shall be placed in layers of a maximum of 6” loose thickness and compacted with approved tampers to the density of the adjacent in-situ soil, and to a height of at least one foot above the utility pipe, conduit or other infrastructure item. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe.
2. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

C. Final Backfill: The remainder of the trench shall be backfilled with satisfactory material removed from the trench. Backfill material shall be deposited and compacted as follows:

1. Under building slabs, roads, walks, parking lots and other structural areas, backfill shall be deposited in maximum 8” loose thickness layers and compacted to 95% maximum dry density at +/-2% of optimum moisture content.
2. Under tracks, tennis courts and other structural athletic areas, backfill shall be deposited in maximum 8” loose thickness layers and compacted to 95% maximum dry density at +/-2% of optimum moisture content.
3. Under synthetic turf playfield areas, backfill shall be deposited in maximum 8” loose thickness layers and compacted to 95% maximum dry density at +/-2% of optimum moisture content.
4. Under general landscape and natural turf playfield areas, backfill shall be deposited in maximum 12” loose thickness layers and compacted to 95% maximum dry density at +/-2% of optimum moisture content.

3.04 FIELD QUALITY CONTROL

A. Testing

1. The Owner may provide soil testing and inspection services during the backfill of trenches as outlined in Project Manual Section 014000 – Quality Requirements.
2. Prime Contractors shall employ the services of an independent testing agent to observe and test backfill operations performed by other Prime Contractors that may affect their work. An independent testing laboratory shall certify that the backfill is suitable for finish construction to be installed over trenches.
3. Prime Contractors shall submit copies of testing laboratory reports to the Owner’s Representative and the Architect for information only.
4. The General Work and Site Work Prime Contractors shall accept in writing any trench backfill and compaction by other prime contractors before installing the remaining finish construction over trench work.

END OF SECTION 312317

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SECTION 312500 - EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 Applicable provisions of the Contract Documents govern work under this section.

1.2 WORK INCLUDED

A. Provide all labor, equipment and materials necessary to maintain erosion control blankets, silt fence, hay bale dikes, sediment traps, inlet protection, and to implement erosion control measures as shown on plans, as required by regulatory permits, and as job conditions dictate. Contractor shall retain the services of a qualified professional to inspect and report on erosion control activities. All contractors performing grading, trenching, or other earthwork shall provide certification that it will comply with Storm Water Pollution Prevention Plan (SWPPP) prepared by the Architect and document their erosion control efforts during all construction activity and one-year warranty period.

B. Related Work Specified Elsewhere:

1. Section 311000 – Site Preparation
2. Section 311001 – Earth Moving-Site Work
3. Section 329200 – Turf and Grasses
4. Section 329300 – Exterior Plants
5. Section 331000 – Water Distribution Piping
6. Section 334100 – Storm Drainage Systems

1.3 SUBMITTALS: Designate erosion control and maintenance activities on submitted Project Schedule. Submit Storm Water Pollution Prevention Plan (SWPPP) certification statement(s) as herein specified before undertaking any construction activity at the site identified in the SWPPP. Also submit pre-construction photographs, short narrative of erosion control implementation as specified herein, and project schedule.

1.4 QUALITY ASSURANCE: All Erosion/Sediment Control activities and water quality objectives performed by the Contractor shall be in compliance with the following standards of practice:

A. NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity.

B. NYSDEC's "New York Standards and Specifications for Erosion and Sediment Control" as published by the Empire State Chapter of the Soil and Water Conservation Society.

C. NYSDEC's "New York State Stormwater Management Design Manual" as prepared by the Center for Watershed Protection.

D. USDA Soil Conservation Service's "Guidelines for Urban Erosion and Sediment Control", latest revision.

E. NYSDEC's "Erosion and Sediment Control Guidelines for New Development T.O.G.S. 5-1.10".

F. Local Guidelines for Erosion and Sediment Control.

G. NYSDEC's "Reducing the Impacts of Stormwater Runoff for New Developments", latest revision.

H. NYSDOT Specifications.

I. Project specific SWPPP and Notice of Intent (NOI).

J. Directives of the Owner, Architect and/or regulatory personnel of authority having jurisdiction requiring further control measures as warranted.

1.5 SEQUENCING AND SCHEDULING

A. Place erosion control measures wherever shown on the Contract Drawings before beginning any other Work of this Contract.

B. Place other erosion control measures shown on the Contract Drawings as soon as possible, relative to other Work of this Contract including, but not limited to, the following:

1. At grading limits, before beginning rough grading.

2. In drainage channels, as soon as subgrade is established.
3. In drainage channels, as soon as topsoil and seed are applied.
4. At drainage structures, as soon as backfill is compacted and frame and grate are installed.
5. At flared end sections, as soon as installation is complete.
6. At all disturbed ground and subgrade as specified.

1.6 FINES FOR VIOLATIONS: Permits and their conditions are part of the Contract Documents and failure to implement these conditions and the requirements of this Contract may result in the issuing agency levying a fine for violating the terms of the permit. The Owner is the permittee on these permits and, therefore, would be fined for such violations. Recognizing that it is the responsibility of each pertinent contractor to abide by permit and contractual requirements, each pertinent contractor shall reimburse the Owner the full amount of all fines levied on account of the pertinent contractor's failure to abide by those requirements.

PART 2 - PRODUCTS

2.1 MULCHES: Mulches shall be suitable material acceptable to the Project Designer and reasonably clean and free of noxious weeds and deleterious materials. The following materials are acceptable:

		Application Rates		
Mulch Material	Quality Standards	Per 1000 SF	Per Acre	Depth
Wood chips or shavings	Green or air-dried, free of objectionable coarse material.	500-900 lbs.	10-20 tons	2 - 7"
Straw	Air-dried; free of undesirable seeds and coarse materials	90-100 lbs. 2-3 bales	2 tons 100-120 bales	Cover about 90% of the surface

2.2 GRASS

A. Grass shall be quick growing species suitable to the area and as a temporary cover which will not compete with the grasses sown later for permanent cover.

B. Seed Mixtures

1. Temporary Seeding

Type	Lbs./Acre	Lbs./1000SF
a. Ryegrass (Annual or Perennial)	80	1.9
b. Certified Aroostook Winter Rye	100	2.5
Use winter rye if seeding in October/November.		

2.3 SOIL AMENDMENTS

A. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Architect.

1. Lime: pH of 6.
2. Fertilizer: Meeting New York State Department of Transportation Specification 713-03 Type 1 or as approved. 1-2-1 N.P.P. ratio.

2.4 EROSION CONTROL BLANKET: Provide rolled erosion control product, biodegradable erosion control blanket, designed for use on slopes as per NYSDOT Approved Material List for rolled erosion control products and soil stabilizers, Class 1, Type C (short term).

2.5 SILT FENCE

A. Silt Fence: Assembled from filter fabric stapled to 36 inch long, 2 inch square hardwood posts or pre-asembled product of equivalent performance characteristics as detailed on the Contract Drawings and in compliance with Storm Water Pollution Prevention Plan.

1. Filter fabric: Shall be on the NYSDOT Approved Material List for geotextiles, approved for use with silt fence, unsupported with 1.2m spacing.

2.6 STABILIZED CONSTRUCTION ENTRANCE: 50/50 mixture of NYSDOT Standard Specifications for Item No. 3 and No. 4 stone.

2.7 CHEMICAL BINDER: Non-toxic conforming to Item 713-12 of NYSDOT Specifications.

2.8 RIP-RAP: Per NYSDOT Specifications.

2.9 STONE: Sound durable stone per NYSDOT Specification Section 703, size(s) per plans.

2.10 ADDITIONAL PRODUCTS: As specified and illustrated on the project plans, as required by regulatory permits, and as job conditions dictate.

PART 3 - EXECUTION

3.1 Contractor shall implement erosion control measures as shown on the plans, as job conditions dictate, and to comply with the SWPPP. Intent is to minimize erosion and pollutants at the source, capture sediment at regular intervals and prevent sediment intrusion into storm sewer pipes, structures, and waterways. Work includes, but is not limited to hay bales, mulching, temporary silt fences, filter fabric, expeditious grading, stormwater diversion, prompt turf establishment, sediment dikes, and maintenance of same.

3.2 The Contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. If disturbed soils surfaces are to be left exposed for a period of greater than 14 days, stabilize the soil with temporary seeding and/or mulch to limit erosion. Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practical. The onset of seasonally adverse weather is not intended as an excuse for not implementing the necessary erosion controls. The Contractor shall use foresight in his activities to only disturb areas that he can stabilize before adverse weather conditions prevail. The Contractor is encouraged to schedule his work such that final land surface restoration closely follows initial disturbance to the maximum extent possible in order to limit bare soil exposure and dependence on the temporary systems discussed above.

3.3 Sediment shall be removed from sediment traps, sediment ponds, or other devices whenever their capacity has been reduced by fifty (50) percent from the design capacity and/or as required to ensure intent. Prior to fine grading and restoration, the Contractor shall remove and dispose of accumulated sediments and silts as required.

3.4 AUTHORITY OF WORK

A. The Owner and Architect has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing the surface area of erodible earth material exposed by excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses and water bodies.

3.5 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Promptly repair equipment leaks. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.

B. Notify Owner, Architect and regulatory authorities having jurisdiction if contaminated soil, groundwater or other forms of pollution are encountered. Excavate and dispose of any contaminated earth immediately in accordance with Federal, State and local regulations off-site, and replace with suitable compacted fill.

C. Pollutants such as fuels, lubricants, bitumens, raw sewage and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or man-made channels leading thereto. Wash water or waste from concrete mixing operations or trucks shall not be allowed to enter live streams.

3.6 DEWATERING AND WASHWATERS

A. Water from aggregate washing, equipment washing, dewatering or other operations containing sediment, shall be treated by filtration, settling basin or other means sufficient to reduce the turbidity, so as not to cause a substantial visible contrast to natural conditions.

3.7 DIVERSION BERMS/SWALES

A. Slopes of significantly barren slopes exceeding 15 percent require special treatment such as water diversion berms,

swales, straw bale sediment barriers, sodding, approved mulch tacking agent over straw mulch applied over seeded areas, or a combination thereof.

3.8 SILT FENCE INSTALLATION

A. A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

Slope Steepness	Maximum Slope Length (Ft)
2:1	50
3:1	75
4:1	100
5:1	150
Flatter than 5:1	150 or as shown on the plans

2. Maximum drainage area for overland flow to a silt fence shall not exceed 2 acres per 100 feet of fence.
3. Erosion would occur in the form of sheet erosion.
4. There is no concentration of water flowing to the barrier.

B. Woven wire fence to be fastened securely to fence posts with wire ties or staples.

C. Filter cloth to be fastened securely to woven wire fence with ties spaced every 24” at top and mid-section.

D. Embed silt fence material a minimum of 6 inches below finished grade.

E. When two sections of filter cloth adjoin each other, they shall be overlapped by six inches and folded.

F. Maintenance shall be performed as needed and material removed when bulges develop in the silt fence, or when 6 inches of sediment has accumulated against it, whichever occurs first. All sediment barriers shall be repaired or replaced when they no longer function as a barrier.

3.9 CONSTRUCTION OPERATIONS

A. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled, both during and after completion of the work, so that erosion will be minimized and sediment will not enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that will minimize sediment-entering streams. Install sediment containment devices around stockpiles and waste areas. Stabilize the surface of temporary haul roads to minimize sediment creation.

B. Install stabilized construction entrances at all ingress/egress points to local and state roads as required and as detailed on the plans.

3.10 CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall take good quality photographs of streams, ditches, channels, ponds or other water bodies immediately adjacent to project work area that will receive runoff from construction activity. Document existing conditions such as existing sediment deposition, water turbidity, eroded streambed/streambanks and condition of vegetation.

3.11 CONSTRUCTION SCHEDULE

A. Prior to beginning construction, the Contractor shall submit for review and acceptance, a detailed project schedule which outlines his program for controlling erosion, limiting conveyance of silt and sediment, pollution prevention, maintenance of devices and controls, and restoration of graded surfaces for the duration of the project and the one-year warranty period.

B. The Architect may limit the area of clearing and grubbing, excavation, trenching and embankment operations in progress, commensurate with the Contractor’s capability, responsiveness, and progress in keeping the finish grading, mulching, seeding and other such permanent control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.

3.12 FINAL STABILIZATION

A. Final stabilization is defined as all soil disturbing activities at the site having been completed, and that a uniform perennial vegetative cover with a density of at least 80% has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

3.13 REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

A. Remove erosion control devices when final stabilization has occurred for the respective areas of the site and are no longer needed.

3.14 CONTRACTOR'S CERTIFICATION: (In general, Contractor's certification is not required if land disturbance is less than one acre for all phases of work. Refer to local government's soil erosion requirements).

A. Contractors are responsible for the performance of their subcontractors and to ensure they properly comply with the SWPPP.

B. All signed Contractor's Certification Statements shall be included in the SWPPP. Copies will be submitted to the Owner and also retained on site by the contractors.

C. Submit a completed copy of the attached Contractor's Certification Statement for all prime and subcontractors anticipated to perform site work at least two weeks prior to beginning construction activity so that they can be included in the SWPPP.

3.15 CONTRACTOR'S RESPONSIBILITY

A. The actual scheduling and implementation of the SWPPP and maintenance of required water quality is the responsibility of the Contractor(s). The erosion and sediment control plan and devices shown are considered to comprise the majority of efforts needed, but not necessarily all that will be required. Weather, the Contractor's schedule, extent of disturbance, site and unforeseen conditions can dictate that greater efforts will be necessary.

B. The Contractor shall retain the services of qualified professional(s) capable of assessing the status of erosion control on the site during its development, performing weekly inspections, quarterly reports complying with NYSDEC Permit Standards, assessing the site's erosion and sediment controls, and maintaining a log book of SWPPP inspections and relevant data. A qualified professional can be a licensed professional engineer, certified professional in erosion and sediment control (CPESC), licensed landscape architect or qualified soil scientist. This log must be available to the the Project Design Team, the Owner or interested regulatory agencies.

C. During each inspection, the qualified responsible person(s) designated by the contractor shall record the following information:

1. On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;
2. Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;
3. Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;
4. Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of the sediment storage volume (for example, 10 percent, 20 percent, 50 percent);
5. Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems, earthen berms or silt fencing and containment systems (sediment basins and sediment tarps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilization vegetation or seeding and mulching. Document any excessive deposition of sediment or ponding water along diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water.
6. All deficiencies that are identified with the implementation of the SWPPP.

E. During construction, copies of all inspection reports will be incorporated into a SWPPP log.

CONTRACTOR CERTIFICATION STATEMENT

Project Name: _____

Project Address: _____

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the New York State Pollution Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

_____

Name and Title

_____

Company Name

_____

Company Address and Phone Number

_____

Signature Date

Responsible for: _____

Trained Individual Responsible for SWPPP Implementation:

_____ _____

Name Title

SECTION 317801 – HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and Specification Sections apply to work of this section.

1.2 SUMMARY

A. This Section includes furnishing all labor, materials, equipment and services required to complete and make fully functional, the work indicated on the Contract Drawings and as described in the Contract Documents. Work includes, but is not limited to the following:

1. Furnishing all work not required in other sections to complete and make operational the water system.

2. Setting up specialized drilling equipment and boring a small diameter pilot hole on the desired vertical and horizontal alignment, using a mechanical cutting head with a high pressure fluid (bentonite slurry) to remove the cuttings. The drill string is advanced with the bentonite slurry pumped through the drill string to the cutting head and then forced back along the outside of the drill string, carrying back to the surface for removal. When the cutting head reaches the far side of the boring, it is removed and a reamer (with a diameter greater than the cutting head) is attached to the lead end of the drill string. The pipeline is attached to the reamer and the pilot hole is then back reamed while the pipeline is pulled into place.

B. The following sections contain requirements that relate to this section.

1. Division 31, Section 312000 “Earthwork-Site,” for excavation, bedding and backfill required for the drilling operation.
2. Division 31, Section 312000 “Earthwork-Site,” for detectable underground tracer wire.
3. Division 33, Section 331000 “Water Distribution Piping,” for water pipe.

1.3 SUBMITTALS

A. General: Submit each item to be used as part of the work for this section according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop drawings: Submit for approval shop drawings and proposed installation procedures and methods for directional boring. The submittal package shall include, but not be limited to, the following items:

1. Contractor’s qualifications, which shall include a list of completed projects with references.
   a. Proposed, directional boring crew intended to perform the Work. The personnel submitted and approved shall be the actual personnel performing this Work.
2. Limits of directional boring and open trenching.
3. Submission of directional boring equipment and specification sheets.
4. Specifications of tracking system which will be used to maintain line and grade for directional boring.
5. Type of drilling fluid.
6. Back reaming technique.
7. Procedure for abandoning misaligned drill tunnels.

C. Record Drawings: At project closeout, submit Record Drawings of installed water piping and products, in accordance

with requirements of General Conditions.

D. Inspection and test reports are specified in Section 333000, sub section 3.10, Field Quality Control.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: The directional boring Contractor and his boring crew shall together have a minimum of 10 successful directional boring installations to their credit.

B. Codes and Standards:

1. Utility Compliance: Comply with Veolia Water regulations and standards pertaining to water systems as the first priority, and the most stringent of the other codes and standards.
2. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of water system materials and products.
3. New York State Regulation Compliance: Comply with the rules, regulations and standards of the New York State Department of Health (NYSDOH) and New York State Department of Environmental Conservation (NYSDEC) pertaining to water services.

1.5 PROJECT CONDITIONS

A. Refer to utility plans of Contract Drawings pertaining to existing above ground and underground utilities.

B. The Contractor shall be held fully responsible for protecting against surface subsidence, damage or disturbance to pavement and structures, drainage conveyances and subsurface utility lines.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate connections to related structures and piping.

B. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. Piping shall conform to the requirements of Section 331000 “Water Distribution Piping”.

2.2 DIRECTIONAL DRILLING EQUIPMENT

A. General: The directional drilling equipment is to consist of a directional drilling rig of sufficient capacity to perform the bore and pull back the pipe, a drilling, fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the installation, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused (if required), a Magnetic Guidance System (MGS) or "walkover" system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, and trained and competent personnel to operate the system. All equipment must be in good, safe condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

B. Drilling rig: The drilling shall consist of a hydraulically powered system to rotate and push hollow drilling pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. Anchor the

machine to the ground sufficiently to withstand the pulling, pushing and rotating pressure required to complete the installation. The hydraulic power system must be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system must be free of leaks. The rig is to have a system to monitor and record maximum pull-back pressure during pull-back operations. A system to detect electrical current from the drill string must be in place with an audible alarm that automatically sounds when an electrical current is detected.

C. Drill Head: The drill head shall be steerable by changing its rotation with the necessary cutting surfaces and drilling fluid jets.

D. Mud Motors (if required): The mud motor shall have adequate power to turn the required drilling tools.

E. Drill Pipe: The drill pipe shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tools joints should be hardened to 32-36 RC.

2.3 GUIDANCE SYSTEM

A. General: Use an electronic "walkover" tracking system or a Magnetic Guidance System (MGS) probe or proven (non-experimental) gyroscopic probe and interface for a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance system must be capable of tracking at all depths up to fifty feet and in any soil condition, including hard rock. It should enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system has to be accurate and calibrated to manufacturer's specifications of the vertical depth of the borehole at sensing position at depths up to fifty feet and accurate to 2 feet horizontally.

B. Components: Supply all components and materials to install, operate, and maintain the guidance system.

C. Operation: Set up and operate the Magnetic Guidance System (MGS) with personnel trained and experienced with the system. Be aware of any geo-magnetic anomalies and consider such influences in the operation of the guidance system.

2.4 DRILLING FLUID (MUD) SYSTEM

A. Mixing System: A self-contained, closed, drilling fluid mixing system of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water, and appropriate additives. The mixing system must be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank must be a minimum of 1,000 gallons. Agitate the drilling fluid during drilling operations.

B. Drilling Fluids:

1. Use drilling fluid composed of potable water and bentonite clay. Supply water from an authorized source with a pH of 8.5-10. Treat any water of a lower pH or with excessive calcium with the appropriate amount of sodium carbonate or equal. No additional material may be used in drilling fluid without prior approval from the Owner’s Representative. The bentonite mixture used must have the minimum viscosities as measured by a March funnel:

Rocky Clay	60 seconds
Hard Clay	40 seconds
Soft Clay	45 seconds
Sandy Clay	90 seconds
Stable Sand	80 seconds
Loose Sand	110 seconds
Wet Sand	110 seconds

2. These viscosities may be varied to best fit the soil conditions encountered, or as determined by the operator. No additional fluid shall be used without prior approval from the Owner’s Representative.

C. Delivery System: Fluid pumping system with a minimum capacity of 35-500 GPM and capable of delivering drilling fluid at a constant minimum pressure of 1200 psi. Employ filters on the delivery system in-line to prevent solids from being pumped into drill pipe. Contain all used drilling fluid and drilling fluid spilled during operations convey to the drilling fluid recycling system or remove by vacuum trucks or other methods acceptable to the Owner's Representative. Maintain a berm, minimum of 12-inches high, around drill rigs drilling fluid mixing system, entry and exit pits and drilling fluid recycling system to prevent spills into the surrounding environment. Furnish pumping equipment and/or vacuum truck(s) of sufficient size to convey drilling fluid from containment areas, to storage and recycling facilities or disposal.

2.5 OTHER EQUIPMENT

A. Pipe Rollers: Use pipe rollers for pipe assembly during final product pull back.

B. Restrictions: Do not use other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections unless approved by the Owner's Representative prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated by the Owner's Representative without undue delay and maintain line and grade within the tolerances prescribed by the particular conditions of the project.

2.6 TRACER WIRE

A. Tracer wire shall be #12 AWG Copper Clad Steel, Extra High Strength with minimum, 1,150 lb break load, with minimum 30 mil HDPE insulation thickness.

B. Tracer wire(s) shall be installed simultaneously with pullback of the pipe. Wire(s) shall either be wrapped around the pipe or taped to the pipe at 10-foot minimum intervals before installation.

C. Tracer wire shall be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

PART 3 - EXECUTION

3.1 PREPARATORY OPERATIONS

A. Utility Line Location:

1. Locate and mark-out all existing, underground utility lines within the area of directional drilling.
2. Determine vertical orientation and depths of all utility lines within the drilling area.

3.2 INSTALLATION

A. Install piping by the horizontal directional boring method, conforming to all aspects of the requirements contained herein.

B. Lines and Grades: The Contractor shall be responsible for proper line and grade.

1. The Contractor shall provide a walkover tracking system for monitoring the progress of the bore path. The system shall include a transmitter attached to the drill head (sonde) and a locating receiver so the bore path can be monitored by the Contractor and the Owner's Representative while advancing the bore and pulling the pipe.
2. Extra work required due to failure to maintain the proper line and grade, as shown on the Drawings, shall be performed by the Contractor at no additional cost to the Owner.

C. Pipe installation by directional boring methods:

1. The drilling method shall include drilling a pilot boring to a predetermined point, where the drill head assembly is replaced with a back reamer, swivel and puller connecting the pipe to the drill string. The tooling shall be configured to allow the pipe to be pulled into the tunnel as it is enlarged by the back reamer. If difficult drilling is encountered and it is anticipated that the drill system cannot pull the pipe without placing excess stresses on the pipe, the tunnel shall be pre-reamed prior to pulling the pipe at no additional cost to the Owner. To assure that excess stress is not imposed on the pipe during the pulling operation, the pipe shall be fitted with a breakaway line swivel having a break value of 12,000 lbs. The pipe shall be fitted with a welded HDPE cap to prevent soil and drilling fluid from entering the pipe.
2. The back reamer selected for the pipe installation shall produce a maximum finished tunnel diameter of 50 percent larger than the maximum diameter of the pipe being installed.
3. The pilot boring and back reaming procedure shall be performed with drilling fluid consisting of a bentonite, polymer, and water mixture that will assure that the tunnel remains open during the drilling and pulling operations. The base water source shall be free of impurities such as salt, calcium, chlorine, acid, and metals. The base water source shall be tested for impurities and the test results shall be submitted to the Owner's Representative for approval prior to use. The water shall be conditioned should test results indicate impurities in the water. The drilling fluid flow shall be stopped and the pressure allowed to bleed off before breaking the drill pipe to add or remove the drill string pipe.
4. The directional boring operation shall progress on a 24 hour basis without stoppage (except for adding drill pipe and connection to back reamer) until the pipe has been completely pulled to the exit point at the drill rig.

D. Redirection of Pilot Boring:

1. Should the pilot boring go off course, the Contractor may attempt to redirect the drill head to the proper line and grade. If the drill string has to be pulled and the drill rack set to a new launch point, the abandoned tunnel shall be sealed by pressure grouting methods.

3.3 HANDLING PIPE

A. Take care during transportation of the pipe such that it will not be cut, kinked or otherwise damaged.

B. Use ropes, fabrics or rubber protected slings and straps when handling pipes. Do not use chains, cables or hooks inserted into the pipe ends. Use two slings spread apart for lifting each length of pipe. Do not drop pipe or fittings into rocky or unprepared ground.

C. Store pipe on level ground, preferably turf or sand, free of sharp objects that could damage the pipe. Limit the stacking of the pipes to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. Where necessary due to ground conditions store the pipe on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

D. Handle assembled pipe in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Position slings for handling at pipe joints. Remove sections of the pipes with cuts and gouges or excessive deformation and replace.

3.4 SITE RESTORATION

A. Following drilling operations de-mobilize equipment and restore the work site to the original conditions or better. Backfill and compact all excavations according to Section 312000 "Earthwork-Site".

3.5 RECORD KEEPING

A. Maintain a daily project log of drilling operations and a guidance system log with a copy available to the Owner's Representative at the completion of project.

B. Record the guidance system data during the actual drilling operation. Furnish "as-built" plan and profile drawings based on these recordings showing the actual location horizontally and vertically of the installation, and all utility facilities

found during the installation. Certify the guidance data to the capability of the guidance system.

END OF SECTION 317801

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aggregate base for asphalt paving
B. Asphalt paving installation over aggregate base
C. Joining new asphalt pavement to adjacent construction
D. Traffic marking of asphalt pavement
E. Field quality control

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 321313 – Concrete Paving
C. Section 321613 – Concrete Curbs
D. Section 321823 – Running Track Surfaces
E. Section 334100 – Storm Drainage System

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Job Mix Formulas: Submit job mix formulas for asphalt paving indicating compliance with the requirements of each asphalt type specified including the name and location of the supplier.

D. Quality Control Submittals

1. Certificates: Submit one copy of all permits obtained from local regulatory agencies and the New York State Department of Transportation.
2. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements specified below in the "Quality Assurance" section of this specification.
3. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable requirements specified in the "Quality Assurance" section of this specification.

E. Closeout Procedures: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Asphalt Producer Qualifications: Use only materials furnished by bulk asphalt producer regularly engaged in the production of hot-mix, hot laid asphalt.

B. Regulatory Requirements

1. Conform to the requirements of local regulatory agencies, or if applicable, the New York State Department of Transportation, which ever is more stringent for methods and materials in work areas subject to applicable agency's review and approval. Provide materials complying with referenced New York State Department of Transportation Standard Specifications where indicated.
2. Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure. Temperature limitations shall be in accordance with NYSDOT (latest addition) or only be placed when the pavement surface temperatures meet the following criteria, whichever is more stringent:

Compacted Lift Thickness	Minimum Surface Temperatures
≤1 inch	50° F
1 inch to 3 inches	45° F
> 3”	40° F

B. Pavement Markings: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials or 55 deg F for water-based materials, and not exceeding 95 deg F. The relative humidity shall not exceed 85%.

C. Tack coat shall not be applied on wet pavement surface or when pavement surface temperatures is below 40° F.

D. Field Measurements: Establish and maintain required lines and elevations for grade control.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base: Comply with the New York State Department of Transportation Standard Specification, Section 304, Paragraph 304-2, as modified in Section 310000 – Earthwork.

a. Base Course: Type 2 crushed stone as modified in Section 311001 – Earthwork-Site Work unless specifically noted otherwise on the Contract Documents.

B. Asphalt Pavement: Paving materials shall comply with the New York State Department of Transportation Standard Specification. Section 400 for the materials indicated.

1. Binder Course: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Section 401 and 403 for Asphalt – Type 3 Binder.

Sieve		Percent Passing	
Sieve Size	Sieve Size (mm)	General Limits	Job Limit Tol. %
1 ½”	37.5	100	-
1”	25.0	95 – 100	-
½”	12.5	70 – 90	+/-6
¼”	6.3	48 – 74	+/-7
No. 6 Sieve	3.2	32 – 62	+/-7
No. 20 Sieve	.850	15 – 39	+/-7
No. 40 Sieve	.425	8 – 27	+/-7
No. 80 Sieve	.180	4 – 16	+/-4
No. 200 Sieve	.075	2 – 8	+/-2

a. The PGB content shall be 4.5 – 6.5%, +/-0.4%.
b. The mixing and placement temperature range shall be 120 – 165 degrees C.

2. Shim Course: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Section 401 and 403 for Asphalt – Type 5 Shim.

Sieve		Percent Passing	
Sieve Size	Sieve Size (mm)	General Limits	Job Limit Tol. %
¼”	6.3	100	-

No. 6 Sieve	3.2	80 – 100	+/-6
No. 20 Sieve	.850	32 – 72	+/-7
No. 40 Sieve	.425	18 - 52	+/-7
No. 80 Sieve	.180	7 – 26	+/-4
No. 200 Sieve	.075	2 – 12	+/-2

a. The PGB content shall be 7.0 – 9.5%, +/-0.4%.
b. The mixing and placement temperature range shall be 120 – 165 degrees C.

3. Topcourse: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Section 401 and 403 for Asphalt – Type 7 Topcourse.

Sieve		Percent Passing	
Sieve Size	Sieve Size (mm)	General Limits	Job Limit Tol. %
½"	12.5	100	-
¼"	6.3	90 – 100	-
No. 6 Sieve	3.2	45 – 70	+/-6
No. 20 Sieve	.850	15 – 40	+/-7
No. 40 Sieve	.425	8 – 27	+/-7
No. 80 Sieve	.180	4 – 16	+/-4
No. 200 Sieve	.075	2 – 6	+/-2

a. The PGB content shall be 5.7 – 8.0%.
b. The mixing and placement temperature range shall be 120 – 165 degrees C.

B. Coatings: Comply with the New York State Department of Transportation Standard Specification, Section 702 for material designations indicated.

1. Tack Coat: Emulsified asphalt, slow setting type, New York State Department of Transportation designation 702-3601 (SS-1h) or 702-4501 (CSS-1h).
2. Asphalt Cement Filler: New York State Department of Transportation Designation 702-05.

2.02 EQUIPMENT

A. Paving Equipment: Spreading, self propelled asphalt paving machines capable of maintaining the line, grade and minimum surface thickness specified. Spreader boxes may be used in areas where specifically approved by the Project Designer.

B. Compacting Equipment: Self-propelled tandem roller with a minimum 10 ton weight. Hand held vibrator compactor may be used in areas not accessible to rollers when specifically approved by the Project Designer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which pavement is to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

b. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Final Preparation of Subgrades: Upon completion of preparation of subgrades as specified in Section 311001, thoroughly scarify the entire area to be paved and compact by rolling to smooth, hard, even surface. Finish to required grades with allowance for pavement courses above.

3.03 INSTALLATION

A. Aggregate Base: Comply with the requirements of the New York State Department of Transportation Standard Specification, Section 304-3, for aggregate gradations specified, unless otherwise indicated.

1. Base Course: Completely fill voids with grits and roll with a 10 ton roller, eliminating movement of the material ahead of the roller. After rolling, verify grading with a minimum ten foot long straight edge. Satisfactorily eliminate any depression over ¼" deep. Obtain approval of base prior to installing asphalt courses above

B. Asphalt Paving: Pave finished surface free from depressions that may collect water. The Contractor shall remove any depressions at their own expense over 1/8" deep when tested with a six-foot straight edge without evidence of patching.

1. Auto Duty Paving: Pave over aggregate base in two courses, 2" compacted depth topcourse over 3" compacted depth binder course. Comply with the New York State Department of Transportation Standard Specification, paragraph 401-3 and paragraph 403-3 for asphalt types specified.
2. Track and Field Area Paving: Pave over aggregate base in two courses, 1-1/2" compacted depth topcourse over 2-1/2" compacted depth binder course. Comply with the New York State Department of Transportation Standard Specification, paragraph 401-3 and paragraph 403-3 for asphalt types specified. Asphalt installation in track and field areas to comply with the requirements of the U.S. Tennis Court and Track Builders Association as described in their publication "Track Construction Manual". Finished asphalt slope tolerances prior to resilient surface application shall be 1% with a deviation not exceeding +/-0.1%.

C. Joining New Asphalt Pavement to Adjacent Construction

1. Carefully construct joints between old and new pavements, or between successive days work to ensure continuous bond between adjoining paving. Construct joints with the same texture, density and smoothness as adjacent sections of asphalt courses. Clean sand, dirt and other deleterious material from contact surfaces and apply tack coat.
2. Offset traverse joints a minimum of 24" between succeeding courses. Cut back pavement to the edge of previously placed courses to expose an even, vertical surface for the full course thickness.
3. Offset longitudinal joints a minimum of 6" between succeeding courses. When edges of longitudinal joints are irregular, honeycombed or inadequately compacted, cut back all unsatisfactory sections to expose an even, vertical surface for the full course thickness.
4. In horizontal joints between the binder and the topcourse, clean all contact surfaces and spray a tack coat prior to the installation of the topcourse if the binder has been in place for longer than seven days or if the pavement is determined to be excessively dirty by the Architect.
5. Seal joints with the application of asphalt cement filler, a minimum of 2" to each side of the joint.

3.04 FIELD QUALITY CONTROL

A. Flood Tests: Perform a flood test in the presence of the Owner's Representative or the Architect utilizing a water tank truck. If a depression ponding water more than 1/8" in depth is found, provide corrective measures to provide proper drainage.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preparation for concrete paving
B. Placement of fabric reinforcement
C. Placement of concrete
D. Placement of joints and sealants
E. Finishing and curing

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 321216 – Asphalt Paving
C. Section 321613 – Concrete Curbs
D. Section 334100 – Storm Drainage System

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Shop Drawings: Submit shop drawings for precast concrete headwall stamped by a licensed professional engineer in the State of New York.

C. Product Data

1. Concrete Mix Design: Submit proposed concrete design mix together with the name and location of the batching plant.
2. Portland Cement: Brand and manufacturer's name.
3. Air Entraining Admixture: Brand and manufacturer's name.
4. Water Reducing or High Range Water Reducing Admixture: Brand and manufacturer's name.
5. Curing and Anti-Spalling Compound: Manufacturer's specifications and application instructions.
6. Welded Wire Mesh and Reinforcing Bars and Dowels: Manufacturer's name.
7. Joint Fillers and Sealants: Catalog sheets, specifications and installation instructions for each product specified.

D. Closeout Procedures: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. At location directed by the Architect, construct concrete flatwork sample panel approximately 5' wide by 15' long.

B. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

C. Regulatory Requirements

1. Conform to the requirements of local regulatory agencies, or if applicable, the New York State Department of Transportation, which ever is more stringent for methods and materials in work areas subject to applicable agency's review and approval. Provide materials complying with referenced New York State Department of Transportation Standard Specifications where indicated.
2. Obtain written permission from applicable agencies prior to the start of construction.

1.05 PROJECT CONDITIONS

A. Maintain access for vehicular and pedestrian traffic as required for other construction activity. Provide barricades, warning signals, warning lights, and similar items as required.

B. Environmental Conditions

1. Humidity and Moisture: Do not install the work under this specification section under conditions that are detrimental to the installation, curing and performance of the specified materials.
2. Temperature: Unless otherwise approved or recommended in writing by the sealant manufacturer, do not install sealants below 40 degrees F. or above 85 degrees F.

C. Protection: Protect all newly poured concrete surfaces from damage. Protect all surfaces adjacent to sealants with non-staining, removable tape or other approved covering to prevent soiling or staining.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cast-In-Place Concrete: Normal weight, air entrained concrete with a minimum compressive strength of 4,500 psi at the end of 28 days.

1. Design Air Content: ASTM C 260, and on the New York State Department of Transportation's current "Approved List"; 6% by volume +/- 1.5%.
2. Cement: ASTM C 150 Type I or II portland cement. Minimum 6.5 bags or 611 pounds per cubic yard.
3. Water: Potable.
4. Slump: Between 2 and 4 inches except when a water reducing admixture is used, the maximum slump shall be 6 inches. When a high range water reducing admixture is used, the maximum slump shall be 8 inches.
5. Water Reducing Admixture: ASTM C 494, Type A and on the current New York State Department of Transportation's current "Approved List".
6. High Range Water Reducing Admixture: ASTM C 494, Type F and on the current New York State Department of Transportation's current "Approved List".

B. Chemical Curing and Anti-Spalling Compound: Water based, acrylic polymer, Type 1, Class A (non-yellowing) compound complying with the requirements of ASTM C 1315.

1. For convenience, details and specifications have been based on the following manufacturers and their products:

a. Vocimp 25 by W.R. Meadows, Inc., Hampshire IL.
b. Super Diamond Clear VOX, Euclide Chemical Co., Inc., Cleveland, OH.
c. Cure and Seal 25% J22UV by Dayton Superior, Dayton, OH.

C. Reinforcement

1. Welded Wire Mesh: Flat sheets of welded, plain, cold drawn steel wire fabric complying with ASTM A 185. Rolled wire will not be acceptable for installation as part of the project.
2. Reinforcing Bars and Dowels: Deformed steel bars, ASTM A 615, Grade 60.

D. Joint Sealants

1. For horizontal joints, two-part self leveling polyurethane sealant for traffic bearing construction.

a. For convenience, details and specifications have been based on the following manufacturers and their products:

(1) Vulkem 255 by Mameco International, Inc., Beachwood, OH.
(2) Urexpan NR-200 by Pecora Corp, Harleysville, PA.
(3) Chem-Calk 550 by Bostik Inc., Middleton MA.
(4) Sealtight Porthane Sealant by W.R. Meadows, Elgin, IL.
(5) Sonolastic SL-2 Joint Sealant Slope Grade by Sonneborn Building Products Inc., Minneapolis, MN.

2. For vertical joints, two-part non-sag polyurethane sealant.

a. For convenience, details and specifications have been based on the following manufacturers and their products:

(1) Vulkem 227 by Mameco International, Inc., Beachwood, OH.

(2) Dynatrol II by Pecora Corp, Harleysville, PA.
(3) Chem-Calk 500 by Bostik Inc., Middleton MA.

E. Joint Fillers

1. Closed Cell Polyurethane Joint Filler: Resilient, compressible, semi-rigid, closed cell isometric polymer foam material, minimum ½" thick similar to Ceramar Joint Filler as manufactured by W.R. Meadows, Inc., Elgin IL.

a. Fiber board or cork joint filler material is not acceptable for use in concrete expansion joint work.

2.02 EQUIPMENT

A. Forms: Steel of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Coat forms with non-staining, clear, paraffin-based form oil that will not discolor or otherwise stain concrete surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which pavement is to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Surface Preparation: Remove all loose material from the compacted sub-base surface prior to placing concrete.

B. Forms: Set forms for 5" thick sidewalks unless specifically noted otherwise true to line and grade and anchor rigidly into position.

C. Space expansion joints equally at not more than 30'-0" on center.

D. Place joint filler at expansion joints and where new concrete abuts existing concrete paving and fixed structures and appurtenances. Protect the top edge of the joint filler during concrete placement with a temporary cap and remove after concrete has been placed. Fill expansion joint with joint sealant after the concrete has been cured complying with the sealant manufacturers installation instructions.

3.03 PLACEMENT OF FABRIC REINFORCEMENT

A. Prior to placement of woven wire mesh, clean thoroughly of mill and rust scale and of coatings that could destroy or reduce bond.

B. Install fabric reinforcement midway between the top and bottom of the concrete slab. Prior to placing concrete, place fabric reinforcement midway between the top and bottom of the slab and secure against displacement with the use of chair carriers or other approved materials.

A. Lap edges and ends of adjoining sheets of fabric reinforcement at least half the mesh width. Offset end laps in adjacent sheets to prevent continuous joints at ends. Interrupt reinforcement at expansion joints, stopping 2" from edges.

3.04 PLACING CONCRETE

A. Moisten the concrete subgrade as required to provide a uniform dampened condition at the time that concrete is placed.

B. Do not place concrete around manholes or other structures until these items are brought to the required grade and alignment.

C. Consolidate concrete by spading, rodding, forking or using an approved vibrator eliminating all air pockets, stone pockets and honeycombing. Work and float concrete surface so as to produce a uniform texture.

D. Locate construction joints (if any) at expansion joint locations.

E. Deposit and spread concrete in a continuous operation between control joints.

3.05 HEADWALL PLACEMENT

A. Install headwall complete in place to the dimensions, lines, and grades as shown on the Plans.

B. Bed precast concrete units on firm, stable material accurately shaped to conform to the shape of unit bases.

C. Provide adequate means to lift and place concrete units.

3.06 FINISHING AND CURING

D. After striking off and consolidating poured concrete, smooth the surface by screeding and floating. Adjust floating to compact the surface and produce a uniform texture.

E. After floating, test the surface for trueness utilizing a 10’ steel straight edge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide a continuous smooth finish.

F. Provide broom finish for walk surfaces.

G. Finish edges of walk and expansion joints with a ½” radius edging tool. Space tool joints equally between expansion joints at approximately 5’-0” on center, unless specifically detailed otherwise on the construction documents.

H. Apply curing and anti-spalling compound in accordance with the manufacturer’s printed instructions.

I. Saw control joints one inch deep after the concrete has set. Space control joints equally between expansion joints at approximately 5’-0” on center, unless specifically detailed otherwise on the construction documents.

3.07 FIELD QUALITY CONTROL

A. Testing by Owner of Concrete Sidewalks

1. Contractor Requirements

a. Provide access to concrete construction and concrete supplier’s facilities for representatives of the testing agency employed by the Owner to perform concrete testing and facility inspections as described below.
b. Notify the Owner’s Representative at least 48 hours in advance of each concrete placement to allow notification of the Owner’s Testing Agency.

2. Concrete Testing During Construction by the Owner’s Testing Agency

a. Sampling Method: ASTM C 172 modified for slump to comply with ASTM C94.
b. Slump Testing (ASTM C143): One test for each concrete load at the point of discharge. One test for each set of compressive strength test specimens, and one test from the middle of each load.
c. Air Content Testing (ASTM C231, Pressure Method): One of each set of compressive strength test specimens; air content checked on every fourth load of “ready-mix” concrete delivered.
d. Compressive Strength Testing

(1) Specimen Preparation: In compliance with ASTM C31 requirements to prepare one set of standard cylinders (minimum six each) for each compressive strength test.

(2) Specimen Testing: In compliance with ASTM C39 requirements for testing of one set of specimens for each 100 cubic yards (or fraction thereof) of each type of concrete placed in each day as follows

(a) Two specimens at seven days after concrete completion.
(b) Three specimens at 28 days after concrete placement.
(c) One specimen retained for later testing, if required.

e. Reporting: Reports containing the following information shall be provided in writing by the Owner's Testing Agency to the Project Designer and the Prime Contractor the same day the tests are accomplished.

(1) Project identification name and number.
(2) Name of prime contractor, concrete supplier and testing agency.
(3) Number (or other designation) of truck delivering the concrete.
(4) Concrete type and class, date of placement, and location of concrete batch within the project.
(5) Design compressive strength at 28 days.
(6) Concrete mix proportions and materials.
(7) Compressive breaking strength and type of break for both 7 day test and 28 day test.

f. Concrete Temperature: Test hourly when air temperature is 40 degrees F. or lower, or when the air temperature is 80 degrees F. or above, and each time compression testing specimens are prepared.

g. Inspection of Supplier Facilities: The Owner's Testing Agency may inspect the concrete supplier's batch plant and review batching procedures as deemed necessary by the Owner, including inspecting the aggregate washing facility, concrete heating system, and concrete transportation equipment.

h. Inspection of Reinforcing Steel: The Owner's Testing Agency may inspect placement of reinforcing steel. Do not begin concrete placement on any pour unless the Owner's Representative and the Project Designer have been notified at least one day preceding the pour to allow reasonable time for inspection of the reinforcing steel.

3.08 ADJUSTING AND CLEANING

A. Repairs and Protection of Concrete Sidewalks

1. Repair or replace broken or defective concrete as directed by the Architect.
2. Protect concrete from damage until acceptance of concrete sidewalk construction. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain walks as clean as possible by removing surface stains as they occur.
3. Sweep concrete walks and wash them free of stains, discoloration, dirt, and other foreign materials just prior to final acceptance.

B. Patching Existing Construction: Repair or patch adjacent existing concrete or other surfaces damaged from concrete sidewalk construction.

END OF SECTION 321313

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SECTION 321613 - CONCRETE CURBS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Curb installation

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 321216 – Asphalt Paving
C. Section 321313 – Concrete Paving

1.03 REFERENCES

A. Comply with ACI 301-89 for all work specified as part of this section unless specifically indicated otherwise within the Contract Documents.

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the "Qualifications" requirements specified below in the "Quality Assurance" section of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.

D. Closeout Procedures: Comply with the requirements of Section 017700.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements

1. Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.06 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

B. Existing Conditions: Maintain access for vehicular and pedestrian traffic as required for other construction activity. Provide barricades, warning signals, warning lights and similar items as required.

1.07 SEQUENCING AND SCHEDULING

A. Proceed with and complete concrete curb construction as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete: Normal weight, air entrained concrete with a minimum compressive strength of 4,500 psi at the end of 28 days. Design air content shall be 6% by volume, with an allowable tolerance of plus or minus 1%. Concrete shall contain a minimum of 6.5 bags of cement per cubic yard. Slump shall between 2 and 4 inches.

B. Joint Fillers: Closed Cell Polyurethane Joint Filler: Resilient, compressible, semi-rigid, closed cell isometric polymer foam material, minimum ½" thick similar to Ceramar Joint Filler as manufactured by W.R. Meadows, Inc., Elgin IL.

1. Fiber board or cork joint filler material is NOT acceptable for use in concrete expansion joint work.

C. Joint Sealants: Two-part non-sag polyurethane sealant. For convenience, details and specifications have been based on the following manufacturers and their products:

1. Vulkem 227 by Mameco International, Inc., Beachwood, OH.
2. Dynatrol II by Pecora Corp, Harleysville, PA.
3. Chem-Calk 500 by Bostik Inc., Middleton MA.

D. Reinforcing Bars and Dowels: Deformed steel bars, ASTM A 615, Grade 60.

2.02 EQUIPMENT

A. Forms: Steel of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Bent, twisted, split or defective form materials are not acceptable. Use flexible spring steel forms to form radius bends. Coat forms with non-staining, clear, paraffin base form oil that will not discolor or otherwise deface the surface of concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which concrete curbs are to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Surface Preparation: Remove all loose material from the compacted sub-base surface immediately before placing concrete. Establish and maintain required lines and grades.

3.03 INSTALLATION

A. Form Construction

1. Set approved forms true to line and grade, rigidly braced and secured. Cast curb in 30-foot-long sections.
2. If curbs will abut existing pavement, locate joints opposite existing pavement joints.
3. Profile of curb to be 18" high by 6" wide with a tooled 1½" radius on the top corner unless specifically detailed otherwise on the Contract Documents.
4. Allow forms to remain in place a minimum of 24 hours after concrete placement.

B. Joint Filler Installation: Provide joint fillers cut to size between the 30-foot sections, at the start and end of curved sections and where curbs abut existing concrete paving, fixed structures or appurtenances. Protect the top edge of the joint filler during concrete placement with a temporary cap and remove after concrete has been placed.

C. Reinforcement Placement: Reinforce curbs as indicated on the Contract Drawings. Maintain a minimum 3" cover on all reinforcing bars.

D. Concrete Placement: Do not place concrete until line and grade of subgrade and forms have been verified. Moisten subgrade as required to a uniform dampened condition at the time concrete is placed. Do not place concrete around structures until these items are brought to the required grade and alignment. Deposit and spread concrete in a continuous operation between joints.

E. Concrete Consolidation: Consolidate concrete by spading, rodding, forking or using an approved vibrator eliminating all air pockets, stone pockets and honeycombing. Consolidate with care to prevent dislocation of dowels and joints.

F. Remove forms and rub exposed face of the curb to a smooth rubbed finish. Plastering is not permitted.

G. Control Joints: Saw cut control joints at 15' O.C.

H. Concrete Curing: Cover and cure newly poured concrete curbs for a minimum of seven days in accordance with ACI 301.

I. Joint Sealant Installation: Remove temporary joint filler cap and install joint sealant per the manufacturer's recommendations.

3.04 ADJUSTING AND CLEANING

A. Repairs and Protection of Concrete Curbing

1. Repair or replace broken or defective concrete curbing as directed by the Architect.
2. Protect concrete curbing from damage until acceptance of the curb construction.

END OF SECTION 321613

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SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Traffic line paint
B. Application of traffic striping and control markings

1.02 RELATED SECTIONS

A. Section 321216 – Asphalt Paving
B. Section 321313 – Concrete Paving

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures.

B. Product Data - Submit manufacturer's specifications and installation instructions.

C. Shop Drawings - Submit drawings and diagrams indicating stripe width of roadway divider stripes and parking stalls, configurations and dimensions of directional arrows, style and size of lettering, configuration and dimensions of international handicapped symbol, and any other traffic control markings on pavement as indicated on the Contract Documents.

D. Quality Control Submittals

1. Qualifications Certification - Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements of this specification.
2. Experience Listing - Submit list of completed projects using products proposed for this project, including owner's contact information and telephone number for each project.

E. Closeout Procedures - Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Design Requirements: Comply with the applicable requirements of New York State Department of Transportation Standard Specification, Section 640 and the "National Manual on Traffic Control Devices" – 2003 Edition and the New York State Supplement.

B. Regulatory Requirements - Obtain written permission from applicable agencies prior to start of construction. Submit copy of permit as specified in "Submittals-Quality Control" above.

1.05 SEQUENCING AND SCHEDULING

A. Proceed with and complete traffic marking installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

B. Perform painting operations after working hours, on weekends or at such time so as not to interfere with the flow of traffic. Provide temporary barriers to prevent vehicles from driving over newly painted areas.

C. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 degrees F for alkyd materials or 55 deg F for water-based materials, and not exceeding 95 deg F. The relative humidity shall not exceed 85%.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Paint - Utilize paint as indicated in NYSDOT Standard Specification, 640-2.

1. White lines shall be used to delineate the separation the traffic flows in the same direction including channelizing lines, stop lines and cross walk lines.
2. Yellow lines shall be used to delineate the separation of flows in opposing directions such as center lines on two-way roads.
3. Yellow lines shall be used to delineate parking space limit lines including lines in no parking areas and associated word and symbol markings.
4. Blue lines shall be used to delineate handicapped parking lines, international symbols and adjacent "no parking" side aisles.

B. Acceptable Products - Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. "Setfast Acrylic Latex Traffic Paint" as manufactured by Sherwin Williams, Co., Cleveland, OH (Tel. #216-566-2902).
2. "Waterborne Hydrophast Traffic Paint" as manufactured by Franklin Paint Company, Inc., Franklin, MA (Tel. #508-528-0303).
3. "Traffic and Zone Marking Paint" as manufactured by PPG Porter Paints, Pittsburgh, PA (Tel. #1-800-332-6270).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions - Examine conditions under which pavement markings are to be installed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Remove dust, dirt and other foreign material detrimental to paint adhesion.

B. Mark layout of stripes and lines with chalk or paint.

3.03 APPLYING PAVEMENT MARKINGS

A. Apply paint in accordance with New York State Department of Transportation Standard Specification Section 640 - 3.02.

B. Do not apply pavement marking paint until layout, colors and placement have been verified with the Owner and the Architect.

C. Allow paving to cure for 30 days prior to starting pavement marking.

D. Clean surfaces to eliminate loose material and dust prior to applying pavement markings.

E. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at the Manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

F. At completion of pavement marking applications, the Contractor shall check all work thoroughly and shall touchup traffic control and parking stall markings that are not distinct or thorough in coverage or are not uniform in color.

3.04 ADJUSTING AND CLEANING

A. Repairs and Protection of Pavement Markings

1. Repair defective pavement markings as directed by the Architect.
2. Protect pavement markings from damage until acceptance of the installation work.

END OF SECTION 321723

SECTION 32 18 13 – SYNTHETIC GRASS SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide labor, materials, services and equipment necessary to furnish and install synthetic surfacing work as indicated and as specified herein, includes, but not limited to:

1. Preparation of stone base and underdrain system.
2. Surfacing of athletic field.
3. Installation of lines, yard markers, and logos.

1.2 RELATED SECTIONS

A. Section 116833 – Athletic Field Equipment
B. Section 311001 – Earthwork-Site Work

1.3 SUBMITALS

A. Submit the following within 72 hours of bid opening, as requested:

1. Most recent installation/reference list for all projects of similar scope to this project completed in the last three years.
2. Required 3rd party insurance policy, demonstrating that all of the requirements outlined in Section 1.4 Quality Assurance are met. Actual policy must be submitted.
3. One (1) 12" x 12" sample of proposed synthetic turf carpet and one (1) 12" x 12" boxed turf sample including infill representative of finished synthetic turf system. Also submit product data and testing documents demonstrating that proposed system meets or exceeds all specified requirements.

B. Submit the following prior to the ordering of materials:

1. Material Certificates and Samples: Provide certificate for each material from material producer that will be used for this project. Each material certificate must be stamped and checked as approved by the Field Builder before submittal to the Architect.
2. Provide to the Architect materials samples of the following: Two (2) 12" x 12" samples of synthetic turf carpet and color yarn samples, (2) 1-lb. bagged samples infill material.
3. Prior to order of materials, the Field Builder shall submit a sample warranty, seam layout plan, striping plan and any details of construction that deviate from the plans and specifications.

C. Quality Control Submittals

1. Test Reports

a. Submit certified copies of independent, third-party laboratory test reports for synthetic turf playfield system components as follows:

(1) Pile height, face width and total fabric weight per ASTM D418 or D5848.
(2) Primary and secondary backing weights per ASTM D418 or D5848.
(3) Tuft bind per ASTM D1335.
(4) Grab tear strength per ASTM D1682 or D5034.
(5) Pill burn test per ASTM D2859.

b. Submit necessary test data from the Installer to the Owner indicating that the finished field meets the required shock attenuation as per ASTM F355.

2. Existing Installation Listing: Provide a list, including project name, owner's representative name and telephone number for a minimum of ten fields of 65,000 SF or more installed in the United States dur-

ing the past two years with the same turf manufacturer, including the same infill products, fiber, and fiber manufacturer proposed for this project.

3. Dynamic Base Stone Acceptance: Prior to beginning installation of synthetic turf surfacing, arrange for a representative of the synthetic turf manufacturer and installer shall inspect the dynamic base stone. The manufacturer and the installer must certify the acceptance of the dynamic base stone for the purpose of obtaining the manufacturer's warranty for the finished synthetic playing surface.

4. Lead Components – As part of the approval process of the submitted product, the synthetic turf playfield system supplier must certify in writing that no lead or lead chromate components are utilized in the manufacturing of the turf.

1.4 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. The latest edition of the following standards as referenced herein shall be applicable.

1. National Federation of State High School Associations (NFHS), "Rules Book" for the following sports:

   a. Football
   b. Soccer
   c. Girl's Lacrosse
   d. oy's Lacrosse
   e. Field Hockey

2. US Lacrosse, "Official Rules for Girl's and Women's Lacrosse" for Women's Lacrosse.

B. Factory Mutual Research Corporation: P7825 Approval Guide – Factory Mutual Research Corporation, current edition

C. American Society for Testing and Materials Standards

1. ASTM C88 – "Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate"
2. ASTM D418 – "Standard Method of Testing Pile Yarn Floor Covering Construction"
3. ASTM D422 – "Standard Test Method for Particle Size Analysis of Soils"
4. ASTM D698 – "Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbs/cubic foot)"
5. ASTM D1338 – "Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings"
6. ASTM D1557 – "Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbs/cubic foot)"
7. ASTM D1577 – "Standard Test Method for Linear Density of Textile Fibers"
8. ASTM D1682 – "Standard Method of Tests for Breaking Load and Elongation of Textile Fabrics"
9. ASTM D2256 – "Standard Test Method for Tensile Properties of Yarns by the Single Strand Method"
10. ASTM D2859 – "Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials"
11. ASTM D2922 – "Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods"
12. ASTM D3385 – "Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer"
13. ASTM D5034 – "Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)"
14. ASTM D5848 – "Standard Test Method for Mass per Unit Area of Pile Yarn Floor Coverings"
15. ASTM F355 – "Standard Test Method for Shock Absorbing Properties of Playing Surface Systems and Materials"
16. ASTM F355-10 – "Procedure A: Testing Services Including Test Number TSI 1202"
17. ASTM F1015 – "Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces"
18. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity"

19. ASTM F1551 – "Standard Test Method for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials"
20. ASTM F1936 – "Standard Test Method for Shock Absorbing Properties of North American Football Field Playing Systems as Measured in the Field"

1.5 QUALITY ASSURANCE

A. Provide a qualified installation foreman to coordinate and review the component parts of the artificial turf system. Submit a resume of experience for Architect's approval prior to starting work.

B. Granulated Infilled Artificial Turf:

1. Factory-trained technicians skilled in the installation of athletic-caliber infilled synthetic turf systems will undertake the placement of the turf. Special brushing equipment and techniques will be used in the installation.
2. The designated installation crew shall have installed a minimum of ten high quality, stadium grade granulated infilled synthetic turf systems of 65,000 square feet or greater in the past three years.
3. A notarized letter from the Field Builder that the installation crew and foreman are factory certified must be submitted prior to the start of turf installation.

C. Provide a colored striping plan detailing lines, numbers and letters. Coordinate with Owner or Owner's Representative and Architect to get final approval of all designated colors, dimensions and logo/lettering designs.

D. The Field Builder shall meet the following criteria:

1. Manufacturer/Field Builder's Experience:

1. The Turf Manufacturer and the Field Builder must be experienced in the manufacturing and installation of this type of artificial turf system and provide project references of the synthetic grass system being installed at 100 similar exterior sites in the United States over the last 5 years, a minimum of 65,000 square feet each.
2. The Field Builder must have actively been in business, under its current name and ownership for at least the past ten years; and must have a minimum of 25 athletic fields still in use in the United States for a minimum of the past 10 years.
3. The Field Builder must provide competent workmen skilled in this type of artificial turf installation. The designated Supervisory personnel on the project must be certified, in writing, by the Field Builder as competent in the installation of this material, including gluing or sewing seams and proper installation of the infill mixture. The Field Builder shall have a qualified job foreman on site to certify the installation and warranty compliance

E. Warranty - The Prime Contractor and/or Manufacturer shall provide a total ten (10) year warranty to the Owner that includes the following in writing in the warranty document:

1. The turf warranty shall be from a single source and shall provide full coverage for all defects in all materials and workmanship of the synthetic turf for its intended usability and playability for the specified warranty period from the Date of Final Completion and acceptance of the turf field. The turf manufacturer must verify that their on-site representative has inspected the installation and that the work conforms to the Manufacturer's requirements.
2. In addition to the required Turf Contractor's/Manufacturer's single source warranty, an additional prepaid insurance policy supported from a third party, A.M. Best, A-rated or better domestic insurance carrier shall be provided for the initial eight-year warranty period. The insurance policy should comply with the following:

1. Be written specifically naming the field or fields being constructed as part of this project requiring payment of a claim be made directly to the Owner of said field. Evidence of such coverage must be submitted and approved.
2. The value of the insured warranty shall be $1,000,000 for each insured warranty with a $5,000,000 annual aggregate.
3. Only true 3rd party warranties are acceptable. Letters of credit submitted as a policy will be rejected as an acceptable substitution to true 3rd party insurance policy.

4. Three copies of the actual 3rd party insurance policy must be provided with the warranty as part of the initial synthetic turf approval submittal package.
5. The 3rd party warranty shall be limited to the initial eight (8) year portion of the synthetic turf system warranty. The additional two (2) year warranty required for the aggregate ten (10) year warranty after the initial eight (8) year duration is completed shall then convert to a standard single source company warranty provided by the Manufacturer covering, but not solely limited to addressing issues such as seam repair, maintenance of specified G-max standards, U.V degradation of fibers, general fiber failure, etc.

3. The turf warranty shall include general wear and damage caused from ultra-violet degradation. Vandalism and Acts of God beyond the control of the synthetic turf manufacturer shall be excluded.
4. The turf warranty shall specifically list what components and properties are covered by the warranty. The list shall include, but not be limited to any and all defects or failures relating to construction of the synthetic turf system, drainage through the synthetic turf system, synthetic turf seam rupture, synthetic turf yarn ultra-violet stability, excessive wear and tensile strength.
5. The turf warranty shall cover defects in the workmanship of installation and further warrants that the installation was done in accordance with both the Manufacturer's recommendations and any written directives of the Manufacturer's on-site representative.
6. The turf warranty shall include all necessary materials, labor, transportation costs, etc., to complete repairs or replacements and dispose of removed materials. The warranty shall guarantee the availability of the same or better replacement materials for the synthetic turf system for the warranty period.
7. The turf warranty shall be non-prorated and shall not place limits on the amount of field's usage.
8. The turf warranty cannot include any form of deductible amount.
9. The turf warranty shall clearly define the conditions under which the Manufacturer considers the warranty to be void.
10. The turf warranty shall define the typical time frame within which repairs will be initiated by the synthetic turf contractor, once notice has been received requesting repairs.
11. The turf warranty shall guarantee that adhesive bonded or sewed seams of all system components remain permanent, tight, secure and hazard free for the entire athletic field playing surface. In addition, all inlaid markings shall remain in place throughout the duration of the warranty period.
12. The turf warranty shall guarantee the installed synthetic turf system's drainage capability shall allow water flow through the entire turf and infill of not less than 10 inches per hour.
13. The warranty shall guarantee the G-max ratings at the completion of construction and for the duration of the warranty as described in this specification.

F. MAINTENANCE

1. The synthetic turf contractor shall provide training for the Owner regarding the recommended maintenance program for the synthetic turf field. The training shall include a detailed review of the turf maintenance manual required to be provided by the synthetic turf manufacturer.

2. The synthetic turf contractor shall provide training for the Owner's facility maintenance staff in the use of the field groomer and all other equipment to be utilized for maintenance of the synthetic turf field.

3. Extra Materials: Upon final completion, provide the following materials directly to the Owner in the minimum quantities specified:

   a. Turf fabric – 100 SF of each color used in playing field areas and logos, excluding the field line colors, with at least one piece of each color being 5' wide by 10' long.
   b. 4" Wide Colored Fabric – Minimum 100 LF of each color specified for inlaid line striping.
   c. 2000 pounds ground rubber in weatherproof bags.
   d. Minimum one 15' x 10' piece of each type of green turf used on the Project.

PART 2 - PRODUCTS

2.1 SYNTHETIC GRASS SYSTEM

A. Synthetic Grass System Description

1. Face Yarn Type: Multifilament system consisting of multiple monofilament strands and multifilament polyethylene slit fiber.
2. Pile Weight: 46 oz/sy minimum. It is acceptable to increase pile weight to meet minimum total product weight required for this turf system.
3. Primary Backing: Minimum 8 oz/sy, double layered polypropylene fabric treated with U.V. inhibitors. It is acceptable to increase primary backing weight to meet minimum total product weight required for this turf system.
4. Secondary Backing: Minimum 20 oz/sy urethane permanently locking fiber tufts in place. It is acceptable to increase secondary backing weight to meet minimum total product weight required for this turf system.
5. Total Product Weight: Total weight of system pile, primary backing and secondary backing to be minimum 74 oz/sy.
6. Yarn Linear Density: Minimum 5,000 denier for slit film fiber and 7200 denier for monofilament fiber.
7. Yarn Thickness: Minimum 100 microns for slit film fiber and 300 microns for monofilament fiber.
8. Pile Height (Finished): Minimum 2.25” nominal finish height.
9. Color: Green (as approved by Owner).
10. Construction: Broadloom tufted
11. Stitch Rate: Maximum 13/3”.
12. Tufting Gauge: Maximum 3/4”.
13. Backing: Non-perforated porous or perforated system.
14. Turf Permeability: >20” per hour.
15. Yarn Break Strength: >8 lbs nominal for slit film fiber and >20 lbs. nominal for monofilament fiber.
16. Yarn Maximum Elongation: 40% nominal.
17. Tuft Bind Without infill: Minimum 9 lbs.
18. Grab Tear (Width): Minimum 200 lbs.
19. Grab tear (Length): Minimum 200 lbs.
20. Flamability (Pill Burn): Pass.
21. Infill Composition: Minimum 3 lbs each /sf ambient or cryogenic SBR crumb rubber particles and rounded or sub-angular, uniformly sized silica sand.
22. Infill Depth: Minimum 1.75” deep at installation.
23. Finished Roll Width: The carpet shall be delivered in 15-footwide rolls with 4” lines tufted into each roll where appropriate.
24. Markings: Provide all necessary game markings including mid lines, circles, goal boxes, etc. All markings shall conform to NCAA standards for boys and girls soccer, field hockey and boys and girls lacrosse.
25. Warranty: Total of 12 years (8-year standard warranty plus 4-year supplemental warranty) from date of Final Completion.
26. Manufacturers of synthetic turf athletic surfacing complying with these specifications include AstroTurf (Telephone #800-723-8873), A-Turf (Telephone #888-777-6910) and Field Turf (Telephone #800-724-2969.

B. Resilient Infill: A resilient infill system, consisting of minimum weights per square foot of rubber or a rubber and sand mixture as specified above engineered to provide the look, feel, footing and shock absorption of a natural grass field in ideal conditions.

1. Sand Particulate. The sand provided as a component of the infill mixture shall be rounded or sub-angular silica sand to minimize abrasion to the athlete and synthetic grass fibers.

2. Rubber Particulate. The rubber provided as a component of the infill mixture shall be ground SBR crumb rubber mixture.

2.2 VERTICAL DRAINAGE BASE MATERIALS

C. Excavation: Existing natural grass field shall be excavated to the depth established by the Architect and as shown on the excavation plan. The sub grade shall be shaped to achieve a .5% (one half of one percent) slope from the center of the field to each sideline in order to mirror the grade of the finished synthetic turf surface. The sub grade shall also be compacted and proof rolled to a minimum of a 95% compaction rate.

D. Geotextile Filter Fabric: Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be Mirafi 140N or approved equal.

E. Drainage Pipe: A network of perforated HDPE highway grade drainage pipe (1" x 12" flat panel pipe with geotextile wrap) shall be installed under a 10" layer of free draining base aggregate. The drainage pipe will be installed in a herringbone pattern every 15 feet on center and shall be connected to perimeter collector lines as shown on drawings. End connectors shall be fabricated for use with 4” drain pipe. Material to be similar to ADS Advantage pipe or approved equivalent.

F. Stone Base Courses: The following gradation of stone is a typical and recommended specification. The synthetic turf base installer is required to focus on achieving the planarity, porosity and compaction requirements to provide a sound crushed stone base for synthetic turf installation above. The final base course materials shall be approved by the synthetic turf manufacturer and contractor prior to installation at the project site.

1. The free-draining base aggregate base layer shall consist of a consistent depth of open graded material. Base drainage aggregate used must achieve a 95% minimum overall compaction rate. Material shall conform to the AASHTO #57 limestone classification.

2. The choker material shall be AASHTO #8. 200 sieve must not exceed 7% passing.

2.3 SEAMS

A. Adhesives for bonding tufted synthetic turf shall be two-component fast-set urethane adhesive obtained from a single manufacturer and be equivalent to Ultrabond Turf PU 2K as manufactured by Mapei Corporation, Deerfield Beach, FL (800) 992-6273, or one-part moisture-cured polyurethane obtained from a single manufacturer and be equivalent to 34-G as manufactured by Synthetic Surfaces, Inc., Scotch Plains, NJ (908) 233-6803, or approved equal as designated by the Field Builder.

1. Seaming Tape: Tape for securing seams in the tufted synthetic turf and inlaid lines shall be high quality tape made with a minimum roll width of 12 inches.

B. Sewn seams: If seams are to be sewn, they must be sewn with high quality cord/thread as recommended by Field Builder.

C. Line Painting: No line painting will be allowed. All markings are to be factory tufted or inlaid at the project site.

D. Panel/Roll Seams: Provide 99% sewn installation; gluing of rolls shall not be acceptable. Minimal gluing will be permitted to repair problem areas, corner completions, and to cut in any logos or inlaid lines as required. All panel seams shall be sewn using double bagger stitches and polyester thread. Make all seams flat, tight, and permanent with separation or fraying.

PART 3 - EXECUTION

3.1 SYNTHETIC FIELD SURFACE

A. The synthetic turf base contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Field Builder's on-site representative, and submitted to the Architect/Owner, verifying that the changes do not in any way affect the warranty.

B. Sub-Grade: The sub grade shall be shaped to mirror the slope of the finished synthetic turf surface as indicated on the grading plan. The sub grade shall also be compacted and proof rolled to a minimum of a 95% compaction rate. Areas which cannot achieve the minimum compaction shall be over-excavated and structural fill shall be installed and re-compacted to the minimum compaction required.

C. Install geotextile fabric over the prepared sub-grade. Provide a 36" minimum overlap at all seams. Fabric shall first be installed in the drainage trenches prior to installation of perimeter collector lines. After backfilling of all trenches is complete, the entire field shall be covered with fabric prior to the base aggregate application.

D. Trenching, Drainage Pipe Installation and Backfilling: All piping shall be as specified and connected by Field Builder's couplers, plugs etc.

1. The base grade shall be shaped to mirror the finished grade and approved by the Architect and/or Owner's Representative. The base contractor shall begin layout and trenching for the drainage network as indicated on the drainage plan and all details that apply. Collector lines shall be installed before lateral lines and shall begin with the deepest elevations. Collector lines shall be connected to discharge outlet at the onset of operations. Trenching progress shall work upward in elevation to allow for immediate discharge of water from the entire field in the event of a rainfall.

2. No trenches, with or without pipe, shall be permitted, to remain unfilled overnight and/or while crews are not progressively working on site.

3. All perimeter trenches must be dug in accordance with the field drainage plan details.

4. After all collector and lateral lines have been installed, the base contractor shall repair any sub grade undulations prior to installing geotextile fabric.

E. Concrete Header Curb and Pressure Treated Wood Turf Nailer: The synthetic turf perimeter fastening structure shall be installed before the drainage aggregate.

1. The 12" x 12" concrete header curb shall be installed in accordance with the Drawings and/or Shop Drawings and these Specifications. The foundation of the concrete header curb shall be a compacted free draining aggregate. Future water entering the foundation shall have a free draining path directly to the perimeter collector pipe.

2. Install a pressure treated wood 2" x 4" nailer. Pressure treated wood nailer shall be set at a distance equal to the synthetic turf finished pile height below top of the curb by means of a Tapcon or ramset every 12 inches. This shall be the responsibility of the base contractor.

F. Base Drainage Aggregate: The installation of the base drainage aggregate shall only begin after the drainage pipe installation has been inspected and approved by Owner's Representative. Installation of the free draining base aggregate shall follow procedures that protect the base grade soils and drainage pipe. The drainage pipe network and its existing elevations shall not be disrupted through ground pressures from trucks, dozers or by any other means.

1. The base grade subsoil shall be dry before undertaking the placement of base aggregate.

2. Delivery trucks shall enter the field only from the designated entrance point. Base course stone shall be dumped closest to the entrance first and continuously worked towards the furthest point of the field. Extreme care must be taken not to disturb sub grade or drainage network.

3. Track-type dozers shall push out the stone from behind the pile onto and toward the field center. Dozers shall only traffic the aggregate they are spreading.

4. Bulldozer blades shall be equipped with a laser-guided hydraulic system. Care shall be taken not to disturb or contact the base grade soils with the dozer blades or tracks. All equipment trafficking over the drainage aggregate shall ensure there is a minimum depth of 9" of aggregate between the geotextile fabric and the dozer track ground contact position.

5. When the aggregate spreading is completed, the surface shall be further-firmed by a 5-ton roller. Static vibration shall not be part of this process.

6. The stone shall be left firm, but not over-compacted as to protect the porosity and drainage capabilities of the aggregate profile.

7. After the drainage stone has been uniformly spread throughout the surface, the surface shall receive a final laser finished grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.

8. The free-draining base course must be installed to a depth as recommended by the Field Manufacturer and shall be independently tested for an overall compaction rate of 95% proctor.

G. Choker Levels: The base drainage stone final elevations shall mirror the proposed choker layer final grade material. Care shall be taken not to allow the coarser aggregate to surface into the profile or finished grade of the choker layer.

1. The choker layer shall be applied using high flotation grading equipment. The choker material shall be evenly spread throughout the proposed field surface to the final pre-pad or pre-turf elevations.

2. After the choker material has been uniformly spread throughout the surface by the described method, the surface shall receive a final laser finish grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.

3. Care shall be taken throughout the installation not to force the choker material into the porosity of the base aggregate below.

4. Final choke layer must be installed to design grades with a finished surface tolerance deviating no more than ¼ inch over 10 feet in all directions. The base contractor must provide a topographical survey with a minimum of 200 shots demonstrating finished grade meets all written requirements.

5. Final layer of stone must be installed at a depth as recommended by the field manufacturer. Finished aggregate base must be proof-rolled by means of 2- to 5-ton roller. The finished aggregate base must achieve an overall compaction rate of 95% proctor in accordance with ASTM D1557. It shall also be flush with top of pressure treated wood nailer.

6. The synthetic turf base contractor is required to string line the entire field every five feet to identify high and low spots. And identified high and low spots must be eliminated prior to installation of the synthetic turf. The base layer topography must be accepted by the synthetic turf manufacturer and installer prior to installing the synthetic turf grass system above.

H. Base Acceptance: The Architect and/or Owner's Representative must jointly approve the base before the turf installation can begin.

I. Synthetic Turf and Infill Materials

1. After a final inspection of the base by the field builder and the Owner's Representative, the synthetic turf installation shall begin. The first roll shall begin with the longest perpendicular cross-field distance. No head seams shall be permitted in the inbound playing surface.

2. The rolls of turf shall be rolled out a minimum of four hours prior to starting seaming procedures and allowed to relax/expand.

    1. All visible wrinkles shall be stretched out before seaming.
    2. Seams shall be flat, tight and permanent with no separation or fraying.
    3. Synthetic turf yarn fabric that is trapped or glued between seams shall be freed from the seams by hand or other approved method to an upright position prior to the commencement of brushing and topdressing procedures.
    4. All synthetic turf seams shall be assembled as follows: The full width rolls shall be laid out across the field. Utilizing standard state of the art adhering or sewing procedures, each roll shall be attached to the next.
    5. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed perpendicular to the playing field. The yard lines, game markings, sidelines, etc. of all applicable sports shall be tufted into carpet by the manufacturer wherever possible.

3. After all seaming is completed and inlaid lines, logos and lettering have been installed; the infill materials shall be spread evenly, using a drop spreader or top dresser.

1. Granulated infill material shall be applied in a uniform rate of multiple applications until the specified infill depth is achieved.
2. Infill material shall be brushed between infill applications with a motorized rotary broom and pull-type groomer brush simultaneously.
3. A minimum infill rate of material per square foot as indicated in Part 2 of this specification is required.

J. Tufted and Inlaid Lines

1. Layout and descriptions of tufted and inlaid lines shall conform to the NFHS standards and approved by the Owner prior to installation.

2. Inlaid lines and field markings shall be cut in using seaming methods recommended by the field builder.

K. Synthetic Turf Perimeter Attachment:

1. After final trimming of the turf, the turf shall be screwed or nailed to the pressure treated wood nailer system as per the field builder's recommendations.

3.2 FIELD LAYOUT

A. Field layout shall be as shown on the record drawings. Typically, the final approved striping and seaming plan used to manufacture and install the field is acceptable. Any Owner-approved changes that take place during the installation must be marked in red and resubmitted.

3.3 CLOSEOUT

A. The Field Builder must verify that a qualified representative has inspected the installation and that the finished field surface conforms to the field builder's requirements.

B. The field builder must submit three (3) copies of its standard maintenance manual to the owner.

C. Field builder must train Owner's designated field personnel in proper grooming and care procedures. This includes training field personnel how to properly use grooming equipment as well as make minor repairs.

3.4 CLEAN UP

A. Field builder shall provide the labor, supplies and equipment as necessary for final cleaning of surface and installed items.

B. All usable remnants of new material shall be neatly rolled up and turned over to the Owner at a place and area designated by the Owner.

C. During the contract and at intervals as directed by the Architect and as synthetic turf installation is completed, clear the site of all extraneous materials, rubbish, or debris and leave the site in a clean, safe, well-draining, neat condition.

D. Surface, recesses, enclosures, etc. shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

3.5 G-MAX AND INFILL DEPTH TESTING

A. Verification of installed infill depth and G-max testing to be performed by an independent testing firm retained and paid for by the Contractor. The testing firm must be approved by the Owner prior to Contractor authorizing any testing work.

1. Infill Depth: Measurement of infill to verify depth shall be taken at a minimum of ten locations throughout each installed playfield area. The amount of installed infill shall in all cases meet the minimum specified depth with an allowable tolerance of plus/minus 1/8".
2. G-Max: Testing shall be performed to verify that shock attenuation properties of the field meet the requirements indicated in this specification. Upon construction completion of the synthetic turf playfield, in place G-Max testing of the synthetic turf system shall be performed in accordance with ASTM F355 and ASTM F1936. G-Max ratings shall fall between 100 and 135 at all test locations with the average of all G-Max readings not exceeding 125.

B. The Owner shall periodically test the playfield area for G-Max properties throughout the entire warranty period of the synthetic turf playfield at their own expense. If test results show that G-Max readings exceed 165 at any location, the synthetic turf contractor shall take all steps necessary to correct the condition. The synthetic turf contractor shall provide the Owner with adequate information to describe the corrective measures to be utilized and shall follow-up in writing confirming that the work provided was successful.

END OF SECTION 321813

SECTION 321823 - RUNNING TRACK SURFACING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Installation of IAAF approved polyurethane synthetic track system on track and field event areas as indicated on the Contract Documents including the layout and linestriping of track lines and markings.

1.02 RELATED SECTIONS

A. Section 116833 – Athletic Field Equipment
B. Section 311001 – Earthwork-Site Work
C. Section 321216 – Asphalt Paving
D. Section 334100 – Storm Drainage System

1.03 SYSTEM DESCRIPTION

A. Design Requirements

1. Install new resilient track surfacing as indicated on the Contract Documents:

a. World Athletics/IAAF approved, impervious, minimum ½”/13mm thick, all weather resilient track surface consisting of a urethane bound black SBR and EPDM base mat sealed with a polyurethane coating. The top surface shall include a structural spray creating a textured top.

2. Track Dimensions and Markings: Provide metric track dimensions and markings conforming to the rules of the National Federation of State High School Associations (NFHS). Verify and certify dimensions and markings as follows:

a. Guarantee all calculations of all dimensions needed to properly mark the track “to be accurate and correct in accordance with the current governing rules and regulations.” Ensure that all dimensions appear on an as-built drawing with date, name and address of the entity making the guarantee.
b. Provide certification by a professional engineer or licensed land surveyor from the State of New York with the proper stamp or certification, date and signature. The certification shall state that “all points shown on as-built drawings were accurately marked and properly designated on the track as shown.”
c. Guarantee all markings on the track by date, name and address of applicator on the as-built drawing indicating that “all markings applied were made using designated marks and in accordance with the current governing rules and regulations and are as shown.”

1.04 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer’s name, specifications and installation instructions for each item specified. Surfacing system components shall exactly adhere to the minimum tested and certified standards set forth by the International Association of Athletic Federations (IAAF).

C. Samples: Submit three samples of materials.

D. A contractor reference list of ten completed outdoor track facilities installed within the last two years of the exact same synthetic track surfacing system scheduled to be installed must be submitted for approval. The reference list must include contact names and phone numbers and must be under the current contractor name including the installing supervisor.

E. A current World Athletics/IAAF test report certifying that the product to be installed complies with the current World Athletics/IAAF Performance Standards for Synthetic Surface Athletic Tracks (Outdoors) with the documented certified test results.

F. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable), indicating compliance with the "Resilient Track Surface Installer Qualifications" requirements specified below in the "Quality Assurance" section of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with the "Quality Assurance" section of this specification.

G. Closeout Procedures: Comply with the requirements of Section 017700. Submittal to include written instructions for the maintenance of the resilient track surface, including the name of the service representative.

1.05 QUALITY ASSURANCE

A. General: The systems listed reflect the intent to establish required running track surface function and standard of quality for construction. The installed surfacing shall comply with the current material testing guidelines published by the American Society of Testing and Materials (ASTM).

B. Resilient Track Surface Installer Qualifications:

1. The Contractor placing the track surface must be a manufacturer approved installer.
2. The track surfacing contractor must furnish evidence that they have been in business for a period of three years under the present corporate name, and, if required, furnish financial statements for each of the past three years.
3. The installer shall have completed a minimum of ten outdoor resilient track surfacing applications within the last two years utilizing the proposed World Athletics/IAAF certified surfacing materials under the current corporate business name.
4. The Contractor must have a minimum of ten years experience in the installation of poured-in-place, two component, elastomeric polyurethane synthetic track surfacing.
5. The Contractor is required to provide documentation that shows the selected specified product complies with current World Athletics/IAAF Performance Standards for Synthetic Surfaced Athletic Tracks (Outdoor) and is certified in terms of the World Athletics/IAAF certification system as updated to present day.
6. The Installer must have one full time employee on staff with a "Certified Track Builder (CTB)" designation as acknowledged by the American Sports Builder's Association. A current CTB certificate must be provided as part of the submittal process for this project.

C. Resilient Track Surface Manufacturer Qualifications
1. The Manufacturer must have a minimum of ten years experience manufacturing polyurethane for synthetic track surfaces.
2. The Manufacturer must offer a minimum of five World Athletics/IAAF certified track systems.
3. The Manufacturer must be ISO 9001 certified.
4. The Manufacturer must supply an affidavit stating that the surfacing system components conform to the World Athletics/IAAF tested and certified property standards.

1.06 WARRANTY

A. Synthetic Track Surface: Provide a warranty for a minimum five-year period from the date of surface acceptance against defects in workmanship, labor and materials. The warranty coverage shall not be prorated nor limited by the usage of the track.

B. Track Linestriping and Markings: Provide a warranty for a minimum two-year period from the date of acceptance against defects in workmanship, labor and materials.

C. Synthetic surfacing material found to be defective as a result of faulty workmanship and/or material failure shall be replaced or repaired at no charge to the Owner upon written notification within the warranty period.

1.07 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.08 SEQUENCING AND SCHEDULING

A. Proceed with and complete resilient track surface installation as rapidly as portions of the track and field area become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. For convenience, the basis of design of details and specifications for running track surfacing within the Contract Documents have been based on products by Beynon Sports, Cockeysville, Maryland (Telephone #410-771-9473) or approved equal to establish quality and function.

B. Base bid track surface described as follows:

5. World Athletic/IAAF approved red choke coat track oval system with dark gray relay exchange zones similar to “BSS 200 Aliphatic Waterborne Synthetic Track Surfacing”. Structural spray systems containing isocyanates will not be considered an equivalent product.

2.02 MATERIALS

A. Red Choke Coat Track System

1. Primer – Beypur 300 (or similar), blended with suitable thinner formulated to be compatible with paved in place EPDM granules and Beypur (or similar) track surfacing.
2. Black SBR Granules – Recycled SBR rubber processed and chopped to 1mm – 3.5mm size containing no dust.
3. EPDM Granules – Rubber granules for the Beypur (or similar) structural spray wearing coats to be EPDM, peroxide cured synthetic rubber containing minimum 20% EPDM resin with a specific gravity of 1.5, +/-0.1g/cm3. The rubber shall be the same color as the track surface.
4. Polyurethane Binder – Beypur (or similar), MDI based single component polyurethane binding agent. The binder shall not have a free TDI monomer level above 0.2% and must be solvent free. The binder must be specially formulated for compatibility with SBR crumb rubber.
5. Waterborne Structural Spray Coating – Beymur 160 (or similar) single component, waterborne pigmented polyurethane specifically formulated for compatibility with EPDM granules. Pigment integrated into the field will not be considered acceptable. The structural spray must be 100% aliphatic, applied in two structural spray layers. Aliphatic varnish coatings over structural spray layers will not be considered for acceptance. Color to be red for the major portion of the track oval and field event areas with dark gray for relay exchange zones.
6. Seal Coat – Beypur 200 (or similar) two component polyurethane resin pigmented to match the color of the wearing coat. The material must be applied by a squeegee to insure the black mat is sealed. Dusting of the base mat will not be considered an acceptable installation method.
7. Line Marking Paint – All line and event markings shall be applied in one coat by experienced personnel utilizing the Manufacturer’s recommended pigmented paint compatible with the specified waterborne track surfacing material.

2.03 WORLD ATHLETIC/IAAF AND ASTM PERFORMANCE STANDARDS

A. Red Choke Coat Track System

1. Thickness: ½” minimum (13 mm)
2. Force Reduction: 35 – 50%
3. Vertical Deformation: 0.6 – 2.5 mm
4. Friction: Greater than or equal to 0.5 (47 TRRL Scale)
5. Tensile Strength: Greater than or equal to 0.5 MPa
6. Elongation at Break: Greater than or equal to 40%
7. Color: Red for the major portion of the track oval and field event areas with dark gray for relay exchange zones.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which running track surfacing is to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. The asphalt base course shall be tested for planarity using a ten-foot straight edge. Leveling work, if necessary, shall be performed so that the finished surface slope is 1%. Low spots shall be repaired prior to the installation of the resilient track surfacing.

B. Following inspection of asphalt macadam and allowing for the required curing time of the base surface, the entire track area shall be thoroughly cleaned, removing any foreign and loose material.

C. Installation of the synthetic track surfacing shall not take place if adjacent or concurrent construction generates excessive dust or abrasives of any other by product that, in the opinion of the installer, would be harmful to the track material.

D. Work shall be delayed if weather and or climatic conditions are detrimental to the proper installation of the synthetic track surfacing. The track surfacing installation shall only be executed in dry conditions.

3.03 RESILIENT TRACK SURFACING APPLICATION

A. Choke Coat Track System

1. Prior to the application of any track surfacing materials, the asphalt base shall be inspected for conformity to planarity requirements. The surface shall not deviate from the planned cross slope for the width of the track by more than maximum 0.2% slope and more than 0.1% slope in the running length of the track. Additionally, the finished asphalt shall not vary more than 1/8" under a 10 feet straight edge. All areas not in conformance with the above requirements shall be repaired with compatible materials as approved by the Manufacturer and allowed to cure prior to the application of the synthetic track surface.
2. The asphalt base course should be cured for a minimum of 14 days and a concrete base for a minimum of 28 days prior to the application of the of the synthetic track surface.
3. The underlying asphalt track surface should be flooded with water. Patch asphalt if bird baths exist after 20 minutes of drying time. Problem bird bath areas shall be milled to a 1" depth with tapered 45-degree edge notch condition and repaved with the specified asphalt topcourse material. Cold tar patching, skin patching or sand mix patching will not be considered acceptable patching practices for use under the new synthetic track surfacing scheduled to be installed above.
4. Any motor oil, hydraulic oil, diesel fuel, gasoline spills, etc., must be completely cleaned and removed, either by milling out or removing and replacing with new keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch with the curing time for the asphalt base being 28 days.
5. The track surfacing contractor must accept the planarity and surface condition of the asphalt base macadam layer in writing prior to installing the rubber track surfacing above.
6. The track surface shall be cleaned of any loose or foreign particles with a power blower, pressure washer or similar equipment prior to the commencement of work.
7. The material components of the specified waterborne synthetic track surfacing system shall be processed and installed by specially designed machinery and equipment. A mechanically operated paver with variable regulated speed and thermostatically controlled screed shall be used in the installation of the base mat. The track wearing course shall be installed using automatic electronic portioning providing for continuous mixing and feeding for an accurate, quality-controlled installation.
8. Apply polyurethane primer uniformly over the entire surface at a rate of no less than 0.3 pounds per square yard. Allow a minimum of 30 minutes curing time before the application of base mat material. Only those areas to be surfaced that day should be primed.
9. The base mat shall consist of a 20 to 22% range of single component polyurethane base mat binding agent and 78 to 80% range, 1 to 4 mm EPDM rubber base mat granulate by weight containing no dust and shall be applied at a temperature of no less than 40 degrees F.
10. The track surfacing mixture shall be prepared in a mechanical mixer or suitable continuous mixer which is clean and dry. The black rubber granules and polyurethane binding agent shall be blended together for a minimum period of two minutes.

11. The thoroughly mixed base mat material shall be applied using a mechanically operated screed machine which has an electrically heated screed to ensure both smoothness and compaction of the surface.
12. All joint work shall be flush with the adjacent mat. Joints which have cured shall have their edges primed with polyurethane primer. The laying procedure shall be bay to bay, limiting the length of the passes so as not to have any cold/cured joints between the bays. Any small irregularities remaining in the surface after the tandem leveler has passed may be removed using a light polyethylene or Teflon roller.
13. After the base mat has cured properly, the entire track surface area shall receive squeegee applied, two component seal/choke coat, applied at a rate of no less than 3.0 pounds per square yard completely sealing the base mat.
14. After the seal coat layer has cured properly, the entire track surface area shall receive two structural spray layers consisting of 60% red or dark gray pigmented polyurethane structural spray binder and 40% red or dark gray pigmented 0.5–2.0 mm EPDM rubber spray layer granulate. Each spray layer shall be uniformly applied at a rate of no less than 1.5 pounds per square yard for total spray coverage of not less than 3.0 pounds per square yard for the two-spray layer.
15. The thickness of the specified aliphatic waterborne synthetic track surface shall be minimum 13mm. The Owner will require four, 3" diameter samples be cored from representative track surface areas by their Independent Testing Agency prior to final acceptance of the track surface. Core sample thickness, consistency and density will be evaluated for acceptability. The track surfacing contractor will be responsible to patch core areas at no cost to the Owner.
16. All line and event markings shall be applied by experienced personnel utilizing polyurethane-based paint compatible with the track surfacing recommended by the track surfacing manufacturer.

3.04 TRACK MARKING APPLICATION

A. Apply paint to running track only after the surface has properly cured. All lane linestriping and marking paint shall be applied in strict accordance with the Manufacturer's written instructions.

B. All markings shall be applied in accordance with the rules and regulations of the National Federation of High School Associations (NFHS).

3.05 TRACK MARKINGS, MEASUREMENTS AND CALCULATIONS

A. All track markings, measurements and calculations shall comply with the following:

1. Locate and establish radius points.
2. Establish and set all necessary control points.
3. Layout all lines and markings to within a +/-½" tolerance.
4. Prepare all necessary drawings certified by a State Licensed Land Surveyor or Professional Engineer. Obtain list of standard events requiring marking from the Owner prior to proceeding with track markings. All markings shall be applied in accordance with the rules and regulations of the National Federation of High School Associations (NFHS). Submit drawing to the Project Designer for approval.
5. Provide all computations and measurements. Use competent, experienced and fully qualified personnel to make measurements. Measurements to be performed by a New York State Licensed Land Surveyor or Professional Engineer.
6. Establish all curve locations using a transit or theodilite capable of reading direct to 20 degrees.
7. Apply one heavy coat of paint to all lines and markings.
8. Use paints directly from original containers. NO THINNING OF PAINTS SHALL BE ALLOWED. Use amount of paint as recommended by the manufacturer.

3.06 ADJUSTING AND CLEANING

A. Repairs and Protection of Running Track Surfacing

1. Repair or replace defective running track surfacing as directed by the Architect.
2. Protect resilient surfacing from damage until acceptance of the running track construction.

END OF SECTION 321823

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SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavation for fence post bases
B. Concrete anchorage for posts
C. Installation of chain link fences
D. Installation of chain link gates

1.02 RELATED SECTIONS

A. Section 321216 – Asphalt Paving
B. Section 321313 – Concrete Paving
C. Section 329200 – Turf and Grasses
G. Section 329300 – Exterior Plants

1.03 REFERENCES

A. Comply with ASTM A 53 for requirements of Schedule 40 piping.

1.04 DEFINITIONS

A. Height of Fence: Distance measured from the top of the concrete footing to the top of the fabric.

1.05 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Shop Drawings: Complete detailed drawings for each height and style of fence and gate required. Include separate schedule for each, listing all materials required and technical data such as size, weight and finish to ensure conformance to the specifications.

D. Quality Control Submittals

1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the "Qualifications" requirements specified below in the "Quality Assurance" section of this specification.
2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.

E. Closeout Procedures: Comply with the requirements of Section 017700.

1.06 QUALITY ASSURANCE

A. Comply with the standards of the Chain Link Fence Manufacturer's Institute, including (unless otherwise indicated):

1. Specification for Metallic Coated Steel Chain Link Fence Fabric
2. Industrial Steel Specification for Fence Rails, Posts, Gates and Accessories
3. ASTM F-567 - Standard Practice for Installation of Chain Link Fence for installation unless otherwise indicated on the Contract Documents.

B. Qualifications

1. Provide metal fences and gates as a complete unit produced by a single manufacturer, including necessary erection accessories, fitting and fasteners. Products shall be provided by a company specializing in commercial quality chain link fencing with at least five years experience.

C. Regulatory Requirements

1. Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.07 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.08 SEQUENCING AND SCHEDULING

A. Proceed with and complete chain link fence and gate installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Framework Standards

1. Steel Pipe: Cold rolled steel pipe meeting the requirements of ASTM A-569 with a minimum yield strength of 50,000 psi.
2. Interior Coating: In line applied zinc rich coating with zinc powder loading of a minimum 90% by weight applied after fabrication conforming to ASTM B 6 high grade and Special High Grade Zinc.
3. Exterior Coatings

a. Base Coat: Minimum .9 ounces zinc per square foot.
b. Intermediate Coat: Minimum 15 microgram chromate conversion per square inch.
c. Top Coat: Minimum 0.3 mil cross link polyurethane acrylic exterior coating.
d. PVC exterior coating: Fusion bonded polyvinyl chloride similar to Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan. Color to be black unless specifically noted otherwise on the Contract Documents.

4. Size of Pipe: As indicated.
5. Similar to SS-40 Pipe with Flo-Coat by Allied Tube and Conduit Corporation, Harvey, Illinois.

B. Framework and Footings for Fences Up To 6'-0" High

1. End Posts, Corner Posts and Pull Posts.

a. Pipe: 2.50" O.D.
b. Set pull posts at the midway point of all lines 500 feet or longer and at all changes of direction or grade of 15 degrees or more. Place pull posts at each radius point within the curved line where the internal angle is 30 degrees or more.
c. Footing Size: 12" O.D. by 4'-0" deep.

2. Line Posts

a. Pipe: 2.00" O.D.
b. Space line posts at a maximum of 10 feet on center unless specifically noted otherwise on the contract documents.
c. Footing Size: 12" O.D. by 4'-0" deep.

C. Framework and Footings for Fences 7'-0" To 9'-0" High

1. End Posts, Corner Posts and Pull Posts.

a. Pipe: 3.00" O.D.

b. Set pull posts at the midway point of all lines 500 feet or longer and at all changes of direction or grade of 15 degrees or more. Place pull posts at each radius point within the curved line where the internal angle is 30 degrees or more.
c. Footing Size: 12" O.D. by 4'-0" deep.

2. Line Posts

a. Pipe: 2.50" O.D.
b. Space line posts at a maximum of 10 feet on center unless specifically noted otherwise on the contract documents.
c. Footing Size: 12" O.D. by 4'-0" deep.

D. Framework and Footings for Fences 10'-0" To 12'-0" High

1. End Posts, Corner Posts and Pull Posts.

a. Pipe: 4.00" O.D.
b. Set pull posts at the midway point of all lines 500 feet or longer and at all changes of direction or grade of 15 degrees or more. Place pull posts at each radius point within the curved line where the internal angle is 30 degrees or more.
c. Footing Size: 12" O.D. by 4'-0" deep.

2. Line Posts

a. Pipe: 3.00" O.D.
b. Space line posts at a maximum of 10 feet on center unless specifically noted otherwise on the contract documents.
c. Footing Size: 12" O.D. by 4'-0" deep.

E. Framework and Footings for Fences Over 12'-0" High

1. End Posts, Corner Posts and Pull Posts.

a. Pipe: 4.00" O.D. unless specifically noted otherwise on the Contract Documents.
b. Set pull posts at the midway point of all lines 500 feet or longer and at all changes of direction or grade of 15 degrees or more. Place pull posts at each radius point within the curved line where the internal angle is 30 degrees or more.
c. Footing Size: 12" O.D. by 4'-0" deep.

2. Line Posts

a. Pipe: 4.00" O.D.
b. Space line posts at a maximum of 10 feet on center unless specifically noted otherwise on the contract documents.
c. Footing Size: 12" O.D. by 4'-0" deep.

F. Post Brace: Provide manufacturer's standard adjustable brace at gate posts and at both sides of corner and pull posts, with a horizontal brace located at the mid-height of the fabric. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

G. Top Intermediate and Bottom Rails

1. 1.66" O.D. pipe, weighing 1.84 pounds per linear foot. Install rails in the manufacturer's longest lengths utilizing expansion couplings, approximately 6" long at each joint. Provide means for attaching the top rail securely to each gate post, corner post, pull post and end post.

a. Provide bottom rail for all fences over 8'-0" in height.
b. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

H. Swing Gate Posts

1. Single leaf of gate up to 6' wide and less than 10' in height: 2.875" O.D. pipe, 5.79 pounds per linear foot.
2. Single leaf of gate 6' to 12' wide or over 10' in height: 4.00" O.D. pipe, 9.11 pounds per linear foot.

3. Single leaf of gate 12’ to 18’ wide: 6.625” O.D. pipe, 18.97 pounds per linear foot.
4. Single leaf of gate over 18’ wide and less than 10’ in height: 8.625” O.D. pipe, 24.70 pounds per linear foot.

I. Swing Gate Framework

1. Up to 6’-0” high and leaf width of 8’-0” or less: 1.660” O.D. pipe, 2.27 pounds per linear foot.
2. 6’-0” to 12’-0” height or leaf width exceeding 8’-0”: 1.90” O.D. pipe, 2.72 pounds per linear foot.
3. 12’-1” to 20’-0” height: 2.375” O.D. pipe, 3.65 pounds per linear foot.
4. Assemble gate frames by welding. Install mid-height horizontal rails on gates over 10’-0” in height. When the width of a gate leaf exceeds 10’-0”, install mid-distance vertical bracing of the same size and weight as frame members. When either horizontal or vertical bracing is not required, provide truss rods as cross bracing to prevent sag or twist.

J. Swing Gate Hardware

1. Hinges: Non-lift type, offset to permit 180-degree swing and of a suitable size and weight to support the gate. Provide 1½ pair of hinges for each leaf over 6’ high.
2. Latch: Forked type for single gates 10 feet wide or less. Drop bar type with keeper for double gates and single gates over 10 feet wide complete with flush plate set in concrete. Drop bar length shall be 2/3 the height of the gate. A padlock eye shall be an integral part of the latch construction.
3. Holdbacks for Vehicular Gates: Type which automatically engages the gate leaf and holds the gate in the open position until manually released.
4. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

K. Chain Link Fabric

1. PVC Coated Fabric: Unless otherwise specified, provide 2” mesh, 9 gauge steel wires, with one piece fabric widths for fencing up to 12 feet high. The PVC coating is to be fused and adhered to galvanized wire in accordance with Federal Specification RR-F-191 H/ID, ASTM F-668 Class 2B, and ASTM F934. Coating thickness to be 7 mils.

   a. Manufacturer: Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan or similar.
   b. Color to be black unless specifically noted otherwise on the Contract Documents.

2. Selvages: Top and bottom selvages to be knuckled unless specifically noted otherwise on the Contract Documents.

L. Post Caps:
1. Weather tight closure cap, one cap per post.
2. Furnish caps with openings to permit passage of rail.
3. Fasteners: Tamper resistant cadmium plated steel screws.
4. PVC Coated: Complying with the requirements of Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan.

M. Stretcher Bars: One piece equal to the full length of the fabric, minimum cross section 3/16” by ¾”. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

N. Metal Bands (for securing stretcher bars): Steel, wrought iron or malleable iron. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

O. Hardware: Self locking bands, tie wires and similar accessories. All hardware ends to pipe rails and other fence components must be of solid construction that prevents access to wasps and similar insects.

1. PVC Coated Hardware: Complying with the requirements of Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan to match color of adjacent fence components.

P. Wire Ties: PVC finish complying with ASTM A809, 0.40 ounces per square foot.

1. For tying fabric to line posts, rails, and braces: 9-gauge steel wire installed at 12” O.C.
2. For tying tension wire to fabric: 11-gauge steel hog rings at 24” O.C.

Q. Truss Rods: 3/8" diameter. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

R. Bolts and Nuts: ASTM A 307, Grade A. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

S. Concrete: Portland cement concrete having a minimum compressive strength of 2500 psi at 28 days.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which chain link fences and gates are to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Clear and grub plant material along the fence line as required to eliminate growth interfering with the fence alignment. Remove all debris from the project property.

B. Do not begin installation of the fence until finish grading in area has been completed.

3.03 INSTALLATION

A. Space posts equidistant in the fence line at a maximum of 10 feet on center unless specifically noted otherwise on the Contract Documents.

B. Setting Post in Earth: Drill holes for fence footings. Set posts in the center of the hole and fill the hole with concrete. Plumb and align posts, vibrate or tamp concrete for consolidation. Finish concrete in a dome shape above the finish grade elevation to shed water. Do not attach fabric to posts until the concrete has cured a minimum of seven days.

C. Setting Posts in Rock: Drill holes into solid rock one inch wider than the post diameter, 18" deep for end, pull, corner and gate posts and 12" deep for line posts. Set posts into holes and fill annular space with shrink resistant grout.

D. Located corner posts at corners and at changes in direction. Use pull posts at all abrupt changes in grade and at intervals no greater than 500 feet. On runs over 500 feet, space pull posts evenly between corner or end posts. On long curves, space pull posts so that the strain of the fence will not bend line posts.

E. Install top rail continuously through post tops or extension arms, bending to radius for curved runs. Install expansion couplings as recommended by the fencing manufacturer.

F. Install bottom and intermediate rails in one piece between posts and flush with the post on the fabric side using special offset fittings where necessary.

G. Brace corner posts, pull posts, end posts and gate posts to adjacent line posts with horizontal rails.

H. Diagonally brace corner posts, pull posts, end posts and gate posts to adjacent line posts with truss rods and turnbuckles.

I. Attach the fabric to the active playfield or security side of the fence. Maintain a 1-inch clearance above the finished grade except where indicated otherwise. Thread stretcher bars through the fabric using one bar for each gate and end post and two for each corner and pull post. Pull fabric tight so that the maximum deflection of the fabric is 2 inches when a 30-pound pull is exerted perpendicular to the center of a panel. Maintain tension by securing stretcher bars to posts with metal bands spaced at 15" O.C. Fasten fabric to

steel framework with wire ties spaced 12" O.C. for line posts and 24" O.C. for rails and braces. Bend back wire ends to prevent injury. Tighten stretcher bar bands, wire ties and other fasteners securely.

1. When the fabric height exceeds 12', overlap horizontal splices 6"at the intermediate rail and secure with wire ties spaced at 12" O.C.

J. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of the fence. Tighten nuts and cut off excess threads so no more than 1/8" is exposed. Peen ends to prevent loosening or removal of nuts. Secure post tops and extension arms with tamper resistant screws.

K. Install gates plumb and level and adjust for full opening without interference. Install ground set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

L. Tension Wire: Support bottom edge of fabric with a tension wire unless specifically indicated otherwise on the Contract Documents. Weave the tension wire through the fabric and fasten with hog rings at 24" O.C. Tie the tension wire to the post with 7-gauge wire ties.

M. Restore disturbed ground areas to their original condition. Topsoil and seed to match adjacent areas.

3.04 ADJUSTING AND CLEANING

A. Repairs and Protection of chain link fences and gates.

1. Repair or replace broken or defective chain link fences and gates as directed by the Architect.
2. Protect chain link fences and gates from damage until acceptance of the fencing construction.

END OF SECTION 323113

SECTION 329200 - LAWNS AND GRASSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Subsoil preparation
B. Placement of topsoil
C. Seeding and application of soil amendments and fertilizers
D. Mulching
E. Protection of seeded areas
F. Turf maintenance during warranty period
G. Cleanup and protection
H. Inspections and final acceptance

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 329223 – Sodding
C. Section 329300 – Exterior Plants

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Quality Control Submittals

1. Experience Listing: Submit a list of completed projects including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.
2. Topsoil Analysis Report: Submit topsoil analysis report for on-site stockpiled or imported topsoil. Do not mix or utilize topsoil until a soil analysis report is approved by the Architect.

a. Provide required representative samples of topsoil and organic or inorganic amendment materials proposed for use in the project to the independent testing agency noted below for analysis and recommended treatment. The Contractor shall pay for all costs incurred for testing and analysis of the soil material. Test reports shall be from current year.

(1) All soil samples and proposed amendments shall be sent to the Owner's Testing Agent:

Hummel & Company, Inc.
35 King Street
Trumansburg, New York 14886
Telephone Number: 607-387-5694

b. All reports shall be sent to the Architect for approval.
c. Samples of imported topsoil to be brought to the site must be approved prior to delivery.
d. Deficiencies in the topsoil shall be corrected by the Contractor, as directed by the Architect, after review of the testing agency report.
e. Ensure test reports include specific recommendations regarding exact types, times and rates of application of soil additives and fertilizers based upon soil test results and type of seed mix to be planted. Follow soil additive recommendations before and during topsoil respread operations. Include the following in the topsoil analysis:

(1) pH factor
(2) Percent organic matter as determined by a Loss on Ignition or Walkey/Black Test (ASTM F-1647.
(3) Proctor testing per ASTM D698.
(4) Chemical analysis testing nitrogen, phosphorus, potassium, calcium, magnesium, cation exchange capacity, base saturation percentages, micronutrients and acidity (pH).
(5) Particle size analysis of the topsoil as determined by ASTM F-1632, performed and compared to the USDA Soil Classification System.

f. Include in the recommendations the type, composition, rate and means of application of soil amendments and fertilizer necessary to establish the required pH factor, organic matter content and supply of nutrients satisfactory for planting.
g. All materials and procedures regarding soil amendments and fertilizers specified in this section are approximate; adjust all soil amendments to comply with the test reports.

3. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

C. Contract Closeout Submittals: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Worker's Qualifications: The person's performing the planting and their direct supervisor shall be personally experienced in the construction and caring of lawn areas. On site supervisory personnel shall have been employed by the company engaged in the installation and care of lawn areas for a minimum of five years. All other individuals on the landscape crew must have a minimum of six months experience in the landscape contracting industry.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Ship seed and associated materials with certificates of inspection required by governing authorities.

B. Do not make substitutions. If specified seed material is not obtainable, submit to the Architect proof of non-availability and a proposal for use of equivalent material.

C. Store all seed at the site in a cool, dry place as approved by the Owner's Representative. Replace any seed damaged during storage.

D. Deliver seed in vendor's unopened packages bearing labels showing the vendor's name and seed analysis by weight.

E. Deliver fertilizer in the manufacturer's standard sized bags showing the weight, analysis, and manufacturer's name. Store all fertilizer under a waterproof cover or in a dry place as approved by the Owner's Representative.

1.06 PROJECT CONDITIONS

A. Water: If available on the site, water will be supplied for the purpose of watering newly planted lawn areas at no cost to the contractor. If water is not available on site, the contractor shall supply water at their own cost as required to maintain the health of the newly planted material.

B. Provide irrigation materials capable of adequately watering new lawn areas until acceptance.

1.07 PESTICIDE APPLICATIONS

A. Any contractor applying pesticides must notify the Owner's designated pesticide representative and all property neighbors not less than 48 hours in advance of any pesticide application including herbicides, insecticides and fungicides in accordance State Regulations and the School Pesticide Neighbor Notification Law, Section 409-H of the New York State Education Law and Commissioner's Regulation 155.24.

1.08 SEQUENCING AND SCHEDULING

A. Proceed with and complete lawn planting as rapidly as portions of the site become available, working within seasonal limitations for the work required.

B. Seed lawn areas during a period between August 15 and October 1. Seeding during unseasonable conditions must be reviewed and approved with the Architect at the sole risk of Contractor.

C. The Contractor shall complete a minimum of three mowings before requesting the Architect review for acceptance of seeding work.

PART 2 PRODUCTS

2.01 SEED

A. Grass seed shall be certified "Blue Tag" seed composed of a blend of varieties mixed in proportion by weight and tested for minimum percentages of purity and germination. Submit the proposed mixture to the Architect for approval.

1. Fall Seeding: Seed blend shall consist of 100% Kentucky Bluegrass on a weight basis. The seed shall be a blend of at least three Kentucky Bluegrass varieties of which no less than 60% of the seed shall be at least two of the following cultivars; Rambo, Princeton-105, Wildwood, Allure, Coventry, Champagne, Northstar, Cardiff, Nimbus, Raven, SR2100, Misty, America, Brilliant, Limousine, Conni, Liberator, Apollo, NuGlade, Total Eclipse, Unique, Impact, Midnight, Arcadia and Serene.

2. Spring Seeding (If approved by the Project Designer): Seed blend shall consist of 80% Kentucky Bluegrass and 20% Perennial Ryegrass on a weight basis. The seed shall be a blend of at least two Kentucky Bluegrass varieties of which no less than 60% of the seed shall be at least two of the following cultivars; Rambo, Princeton-105, Wildwood, Allure, Coventry, Champagne, Northstar, Cardiff, Nimbus, Raven, SR2100, Misty, America, Brilliant, Limousine, Conni, Liberator, Apollo, NuGlade, Total Eclipse, Unique, Impact, Midnight, Arcadia and Serene. The Perennial Ryegrass may be any one of the following cultivars; Palmer III, Calypso II, Brightstar II, Secretariat, Monterey, Catalina, Pennant II, Premier II, Sonata, Sunshine and Ascend. The Perennial Ryegrass shall have a minimum germination percentage of 85%. The percentage of weed seed shall not exceed 1% and other crop seed shall not exceed 0.5% by weight of the mixture. Any variety substitutions or deviations from these specifications must be approved by the Architect.

2.02 TOPSOIL

A. Use either approved topsoil imported to the project site or approved on-site topsoil stripped, stockpiled and amended to meet the required specifications.

1. On-site topsoil shall be from existing stockpiles stripped from the project site and approved by the Architect.
2. Where quantity of topsoil required exceeds that available from on-site stockpiles, provide imported topsoil from local sources or from areas having similar soil characteristics to that found on the project site which are producing or have produced fair to good yield farm crops without unusual fertilization for a minimum period of ten years or from arable or cultivable areas supplied with good natural drainage. Do not obtain topsoil from bogs or marshes or from farmland that has utilized "Atrizine" or similar herbicide within the past five years.

B. Provide topsoil conforming to the following:

1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.
2. Containing not less than four percent nor more than 20 percent organic matter in that portion of a sample passing a ¼" sieve when determined by the wet combustion method on a sample dried at 105 degrees F.
3. Containing a pH value within the range of 6.3 and 7.0 on that portion of the sample which passes a ¼" sieve.
4. On-site and imported topsoil shall be mechanically screened prior to respreading to comply with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING
¾ inch	100
¼ inch	97 – 100
No. 200	20 - 65

2.03 FERTILIZER

A. Mixed commercial fertilizers containing total nitrogen, available phosphoric acid and soluble potash in the ratio of 10-6-4 (50% N/UF). 50% of the total nitrogen shall be derived from a urea form furnishing a minimum of 3.5% water insoluble nitrogen (3.5% WIN). The balance of the nitrogen shall be present as methylene urea, water soluble urea, nitrate and ammoniacal compounds.

2.04 LIME

A. Dolomitic Limestone: Approved agricultural dolomitic limestone containing no less than 50% of total carbonates and 25% total magnesium with a neutralizing value of at least 100%. The material shall be ground to such a fineness that 40% will pass through a number 100 U.S. standard sieve, and 98% will pass through a number 20 U.S. standard sieve. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

B. Calcitic Limestone: Approved agricultural calcitic limestone containing a minimum of 86% calcium carbonate expressed as CaCO3. The material shall be ground to such a fineness that 40% will pass through a number 100 U.S. standard sieve, and 98% will pass through a number 20 U.S. standard sieve. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

2.05 MULCH

A. Dry Application Straw: Stalks of oats, wheat, rye or other approved crops which are free from noxious weeds. Weight shall be based on 15% moisture.

B. Hydro-Application: Colored wood cellulose fiber product specifically designed for use as a hydro-mechanical applied mulch.

1. For convenience, details and specifications have been based on the following manufacturers and their products:

a. Conwed Hydro Mulch as manufactured by Conwed Fibers, Hickory NC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which lawn installation is to be completed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable, to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Strip and stockpile full depth of existing topsoil. Screen topsoil to comply with gradation specifications prior to respread of the material.

B. Perform earthwork operations to accomplish design elevations as indicated on the Contract Documents. Loosen subgrade of lawn areas to a minimum depth of four inches. Remove stone and any other deleterious matter encountered over 1½" in any dimension within the subgrade.

C. Respread screened topsoil in general lawn areas (non playfield areas) to a minimum depth of six inches as required to meet lines, grades, and elevations shown after light rolling and settlement.

D. Provide lime or sulfur as required to adjust pH of the screened topsoil to be 6.3 to 7.0. Apply lime or sulfur materials at a rate of 80 pounds per 1000 square feet (final application rate to be determined by the soil test report). Cultivate soil amendments to a four-inch depth.

E. Grade lawn areas to a smooth even surface with loose, uniformly fine texture. Roll, rake, remove ridges and fill depressions as required to meet finish grades. Limit fine grading operations to areas which can be planted immediately after grading.

F. Moisten prepared lawn areas before seeding if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

G. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

H. Preparation of Unchanged Grades: Where lawns are to be seeded in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare the soil bed for lawn planting as follows:

1. Prior to preparation of unchanged grades, remove existing grass, vegetation and turf. Dispose of such material outside of the Owner's property; do not turn over into the soil being prepared for lawns unless specifically indicated to do so on the Contract Drawings.
2. Till soil to a depth of not less than six inches.
3. Apply soil amendments and initial fertilizers as recommended.
4. Remove high areas and fill in depressions.
5. Till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

3.03 SEEDING

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Application Rate: Six pounds of seed per 1000 square feet.

C. Dry Mechanical Application of Seed: Sow seed with Brillion seeder with notched rollers in three passes, second pass at 90 degrees to the first and the third at 45 degrees to the second. Sow at a rate of two pounds per 1000 square feet for each pass for a total of six pounds per thousand square feet. Incorporate the seed into the upper one inch of the prepared soil bed and water with a fine spray.

D. Hydroseeding

1. Apply seeding material with an approved hydroseeder.
2. Fill tank with water and agitate while adding seeding materials. Use sufficient fertilizer, mulch and seed to obtain the specified application rate. Maintain constant agitation to keep the contents in a homogeneous suspension. Prolonged delays in application or agitation that may cause injury to the seed will be the basis for rejection of the material remaining in the tank.
3. Distribute uniformly a slurry mixture of water, seed, fertilizer and mulch at a minimum rate of 57 gallons per 1000 square feet. (2500 gallons per acre).The Owner's Representative may order the amount of water increased if distribution of seeding materials is not uniform.

3.04 MULCHING

A. Dry Application: Immediately following seeding operations cover seeded areas with a uniform blanket of shredded straw mulch mechanically blown at a rate of 100 pounds per 1000 square feet of seeded area.

B. Hydro Application: Apply approved mulch in accordance with the manufacturer's written instructions and recommended rates of application.

3.05 PROTECTION OF SEEDED AREAS

A. Where grade is less than 3:1, mechanically spread mulch material and crimp into soil utilizing approved disc type machinery with rows at a 6" spacing.
B. Where grade is 3:1 or greater, cover seeded areas with jute matting and roll matting down over the slopes without stretching or pulling.

1. Lay the jute matting smoothly on the soil surface, burying the top end of each section in a narrow six-inch trench. Leave a 12-inch overlap from the top roll over the bottom roll. Leave a four inch overlap over the adjacent section.
2. Staple outside edges and overlaps at 36-inch intervals.
3. Lightly dress slopes with topsoil to ensure close contact between the matting and the soil layer below.
4. In ditches, unroll matting in the direction of flow. Overlap ends of strips six inches with the upstream section on the top.

3.06 MAINTENANCE

A. Begin maintenance immediately after seeding. If seeded in the fall, continue maintenance the following spring until acceptable lawn conditions are established.

B. Water to ensure proper seed germination and to keep the surface of the seed bed damp. Continue watering new seeding until acceptance by the Owner. Apply water slowly so that the surface of the soil will not puddle or crust.

C. Cut grass for the first time when it reaches a height of 2½" and maintain a minimum height of 2". Do not cut more than 1/3 of the blade at any one mowing. Remove clippings.

D. Apply herbicide as soon as weeds germinate, during calm weather when the air temperature is above 50 degrees F. using a licensed applicator to apply the herbicide. When using herbicides, apply in accordance with the manufacturer's instructions.

E. Replant damaged grass areas showing root growth failure, deterioration, bare spots and eroded areas.

F. Refertilize newly seeded areas 28 days after the initial seeding. Apply a minimum of one pound of nitrogen per 1000 square feet of athletic field area. Use a complete fertilizer with a 2-1-1 ratio or as recommended by soil test results.

3.07 CLEANUP AND PROTECTION

A. During landscape construction work, keep pavements clean and the project area in an orderly condition.

B. Protect landscape construction and materials from damage due to landscape operations, operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape construction as directed.

3.08 INSPECTIONS AND FINAL ACCEPTANCE

A. When seeding work and lawn establishment is completed, (including maintenance), request the Architect to make an inspection to determine acceptability. Final acceptance of lawn areas will be granted when a uniform stand of acceptable grass is obtained with a minimum of 95% coverage.

B. Where inspected lawn installation does not comply with the requirements of the Contract Documents, repair rejected work. The Contractor's maintenance responsibility shall continue until reinspected by the Architect and found acceptable. Maintenance responsibilities shall include refertilization, overseeding, watering and mowing of seeded areas.

END OF SECTION 329200

SECTION 329223 - SODDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Subsoil preparation
B. Placement of topsoil
C. Sodding and application of soil amendments and fertilizer
D. Turf maintenance during warranty period
E. Cleanup and protection
F. Inspections and final acceptance

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 329200 – Turf and Grasses
C. Section 329300 – Exterior Planting

1.03 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. Quality Control Submittals

1. Experience Listing: Submit a list of completed projects including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.
2. Topsoil Analysis Report: Submit topsoil analysis report for on-site stockpiled or imported topsoil. Do not mix or utilize topsoil until a soil analysis report is approved by the Architect.

a. Provide required representative samples of topsoil and organic or inorganic amendment materials proposed for use in the project to the independent testing agency noted below for analysis and recommended treatment. The Contractor shall pay for all costs incurred for testing and analysis of the soil material. Test reports shall be from current year.

(1) All soil samples and proposed amendments shall be sent to the Owner's Testing Agent:

Hummel & Company, Inc.
35 King Street
Trumansburg, New York 14886
Telephone Number: 607-387-5694

b. All reports shall be sent to the Architect for approval.
c. Samples of imported topsoil to be brought to the site must be approved prior to delivery.
d. Deficiencies in the topsoil shall be corrected by the Contractor, as directed by the Architect, after review of the testing agency report.
e. Ensure test reports include specific recommendations regarding exact types, times and rates of application of soil additives and fertilizers based upon soil test results and type of sod to be planted. Follow soil additive recommendations before and during topsoil respread operations. Include the following in the topsoil analysis:

(1) pH factor
(2) Percent organic matter as determined by a Loss on Ignition or Walkey/Black Test (ASTM F-1647.
(3) Proctor testing per ASTM D698.
(4) Chemical analysis testing nitrogen, phosphorus, potassium, calcium, magnesium, cation exchange capacity, base saturation percentages, micronutrients and acidity (pH).
(5) Particle size analysis of the topsoil as determined by ASTM F-1632, performed and compared to the USDA Soil Classification System.

f. Include in the recommendations the type, composition, rate and means of application of soil amendments and fertilizer necessary to establish the required pH factor, organic matter content and supply of nutrients satisfactory for planting.

g. All materials and procedures regarding soil amendments and fertilizers specified in this section are approximate; adjust all soil amendments to comply with the test reports.

3. Submit sod vendor's certified statement for each grass species in the sod blend, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

C. Closeout Procedures: Comply with the requirements of Section 017700.

1.04 QUALITY ASSURANCE

A. Sod Grower's Qualifications: All sod for the project shall be commercially grown by a producer specializing in sod production and harvesting with a minimum of five years experience.

B. Certifications: All sod delivered to the site shall be accompanied by a certificate indicating compliance with the regulations of the New York State Department of Agriculture and Markets.

C. Sod Installer's Qualifications: The person's performing the sodding work and their direct supervisor shall be personally experienced in the construction and caring of sodded areas. On site supervisory personnel shall have been employed by the company engaged in the installation and care of lawn areas for a minimum of five years. All other individuals on the landscape crew must have a minimum of six months experience in the landscape contracting industry.

1.05 DELIVERY, STORAGE AND HANDLING

A. Tag sod with the common name of each grass species.

B. Protect the sod's root system from exposure from sun and wind.

C. Protect sod against dehydration, contamination, and heating during transportation and delivery.

D. Do not deliver more sod than can be installed within a 24-hour period.

E. Store sod in a moistened condition under shade or cover with wet burlap.

F. Deliver fertilizer in the manufacturer's standard sized bags showing the weight, analysis, and manufacturer's name. Store all fertilizer under a waterproof cover or in a dry place as approved by the Owner's Representative.

1.06 PROJECT CONDITIONS

A. Do not install sod when the temperature is below 32 degrees F. or on saturated or frozen soil.

B. Protect newly installed sod against vehicular and pedestrian traffic.

C. Water: If available on the site, water will be supplied for the purpose of watering newly sodded lawn areas at no cost to the contractor. If water is not available on site, the contractor shall supply water at their own cost as required to maintain the health of the newly installed sod material.

D. Provide irrigation materials capable of adequately watering newly sodded areas until acceptance.

1.07 PESTICIDE APPLICATIONS

A. Any contractor applying pesticides must notify the Owner's designated pesticide representative and all property neighbors not less than 48 hours in advance of any pesticide application including herbicides, insecticides and fungicides in accordance State Regulations and the School Pesticide Neighbor Notification Law, Section 409-H of the New York State Education Law and Commissioner's Regulation 155.24.

1.08 SEQUENCING AND SCHEDULING

A. Proceed with and complete sod installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

B. Sod lawn areas during a period between April 15 and November 1. Sodding during unseasonable conditions must be reviewed and approved with the Architect at the sole risk of Contractor. Sodding work shall not proceed if the ground is frozen or if provisions for temporary or permanent irrigation are not in place.

C. The Contractor shall complete a minimum of three mowings before requesting the Architect review for acceptance of the sodding work.

PART 2 PRODUCTS

2.01 SOD

A. Provide strongly rooted sod, grown on mineral soil, not less than one year old or more than two years old from the time of original seeding that shall have undergone a regular fertilization program developed by the cultivator prior to harvest. Sod shall be free of weeds, undesirable native grasses, disease and insects, and of good, uniform color, density and thickness. Sod with any Poa Annua shall be rejected; harvesting fields must be fumigated prior to sowing of seed. Uniformity of cut is required. Sections of tattered or ragged edges will be rejected. Provide sod capable of growth and development when planted.

B. The sod blend shall consist of 100% Kentucky Bluegrass on a weight basis. The component seed shall be a blend of at least three Kentucky Bluegrass varieties of which no less than 60% of the seed shall be at least two of the following cultivars; Rambo, Princeton-105, Wildwood, Allure, Coventry, Champagne, Northstar, Cardiff, Nimbus, Raven, SR2100, Misty, America, Brilliant, Limousine, Conni, Liberator, Apollo, NuGlade, Total Eclipse, Unique, Impact, Midnight, Arcadia and Serene.

C. Provide sod grown in “big roll” form unless specifically noted otherwise on the Contract Documents. The sod shall be cut four feet wide by approximately 50 feet long at a uniform soil thickness of 0.60” as necessary for plant viability during harvest, transport and installation. Measurement of the thickness of the sod shall exclude top growth and thatch.

1. For convenience, details and specifications have been based on sod produced by DeLalio Sod, Dix Hills, NY (Tel #1-631-242-3700).

D. Provide sod grown in “big roll” form unless specifically noted otherwise on the Contract Documents. The sod shall be cut four feet wide by approximately 50 feet long at a uniform soil thickness of 0.75” as necessary for plant viability during harvest, transport and installation. Measurement of the thickness of the sod shall exclude top growth and thatch.

1. For convenience, details and specifications have been based on sod produced by DeLea Sod Farms, East Northport, NY (Tel #1-631-368-8022).

E. Any plastic mesh grid delivered with sod MUST be removed prior to installation.

F. Sod shall be harvested, delivered and installed within a period of 24 hours. Soil on sod pads shall be kept moist at all times. Broken pads and torn or uneven sides and ends will not be acceptable.

2.02 TOPSOIL

A. Use either approved topsoil imported to the project site or approved on-site topsoil stripped, stockpiled and amended to meet the required specifications.

1. On-site topsoil shall be from existing stockpiles stripped from the project site and approved by the Architect.
2. Where quantity of topsoil required exceeds that available from on-site stockpiles, provide imported topsoil from local sources or from areas having similar soil characteristics to that found on the project site which are producing or have produced fair to good yield farm crops without unusual fertilization for a minimum period of ten years or from arable or cultivable areas supplied with good natural drainage. Do not obtain topsoil from bogs or marshes or from farmland that has utilized “Atrizine” or similar herbicide within the past five years.

B. Provide topsoil conforming to the following:

1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.
2. Containing not less than 4 percent nor more than 20 percent organic matter in that portion of a sample passing a ¼" sieve when determined by the wet combustion method on a sample dried at 105 degrees F.
3. Containing a pH value within the range of 6.3 and 7.0 on that portion of the sample which passes a ¼" sieve.
4. On-site and imported topsoil shall be mechanically screened prior to respreading to comply with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING
¾ inch	100
¼ inch	97 – 100
No. 200	20 - 65

2.03 SAND

A. ASTM C-33 concrete sand with the following modifications:

1. Fineness modulus of 2.5 to 3.2.
2. Coefficient of uniformity (D60/D10) of less than 4.

B. The Contractor must deliver a sample of the proposed sand amendment material to the Owner's Testing Agent (Hummel and Company) for analysis. The Contractor will be responsible for all testing costs.

2.04 COMPOST

A. Organic composted material meeting the following criteria:

1. Organic matter content of no less than 40% as determined by ASTM D2974.
2. Moisture content of 35 – 65% as determined by ASTM D2974.
3. A carbon/nitrogen ratio of 15:1 to 30:1.
4. Soluble salts not exceeding 6 mS.
5. A Solvita Maturity Index of 6 to 8.
6. 95 – 100% passing a 3/8" screen.
7. pH of 6.0 to 8.0.
8. Non-phytotoxic.
9. Electrical conductivity of less than 2 dS/m.

B. The Contractor must deliver a sample of the proposed compost amendment material to the Owner's Testing Agent (Hummel and Company) for analysis. The Contractor will be responsible for all testing costs.

2.05 FERTILIZER

A. Superphosphate: Fertilizer composed of triple superphosphate (0-46-0) as commonly used for agricultural purposes. The superphosphate shall be delivered in the original unopened bags or containers bearing the manufacturer's guaranteed analysis. Any fertilizer material that gets wet, caked or otherwise damaged will be rejected for use in the project.

B. Starter Fertilizer: 18-24-12 fertilizer or similar analysis with a minimum of 75% of total nitrogen, 16% derived from urea and methylene ureas and a minimum of 24.4% from monoammonium phosphate.

2.06 LIME

A. Approved agricultural dolomitic limestone containing no less than 50% of total carbonates and 25% total magnesium with a neutralizing value of at least 100%. The material shall be ground to such a fineness that 40% will pass through a number 100 U.S. standard sieve, and 98% will pass through a number 20 U.S. standard sieve. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which sod installation is to be completed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 SOIL PREPARATION

A. Strip full depth of existing topsoil and stockpile at location as indicated on the Contract Drawings or as directed by the Owner's Representative.

B. Screen topsoil to comply with gradation specifications prior to respread of the material.

C. Perform earthwork operations to accomplish design elevations as indicated on the Contract Documents. Loosen subgrade of areas to be sodded to a minimum depth of four inches. Remove stone and any other deleterious matter encountered over 1½" in any dimension within the subgrade.

D. Respread screened topsoil to a minimum depth of eight inches as required to meet lines, grades, and elevations shown after light rolling and settlement. Topsoil shall be spread utilizing only tracked equipment with a low ground pressure. Under no circumstances shall trucks drive over spread topsoil areas. Topsoil shall not be worked when wet. The final compaction level shall not exceed 85% maximum standard proctor density as determined by ASTM D698.

E. Provide lime or sulfur soil amendments as required to adjust pH of the screened topsoil to 6.3 to 7.0. Apply lime or sulfur materials at a rate of 80 pounds per 1000 square feet (final application rate to be determined by the soil test report). Cultivate soil amendments to a four-inch depth.

F. After the topsoil has been placed on the field but prior to finish grading, apply triple phosphate fertilizer at a rate of 20 pounds per 1000 square feet (final application rate to be determined by the soil test report). Cultivate fertilizer to a four-inch depth.

G. Grade lawn areas to a smooth even surface with loose, uniformly fine texture. Roll, rake, remove ridges and fill depressions as required to meet finish grades. Limit fine grading operations to areas which can be planted immediately after grading. All finish grading shall be completed with small tractors outfitted with flotation tires or low ground pressure dozers. Finish grading machines shall be equipped with laser machine control systems.

H. Restore topsoiled areas to specified condition if eroded or otherwise disturbed after fine grading and prior to sodding.

I. Preparation of Sodded Areas with Unchanged Grades: Where lawns are to be sodded in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare the soil bed as follows:

1. Prior to preparation of unchanged grades, remove existing grass, vegetation and turf. Dispose of such material outside of the Owner's property; do not turn over into the soil being prepared for lawns unless specifically indicated to do so on the Contract Drawings.
2. Till soil to a depth of not less than six inches.
3. Apply soil amendments and initial fertilizers as recommended.
4. Remove high areas and fill in depressions.
5. Till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

3.03 SODDING

A. Immediately prior to sodding operations, the topsoil bed shall be lightly scratched with a fine-toothed harrow or hand rake to provide a slightly roughened surface to accept the sodding installation.

B. Moisten prepared topsoil areas before sodding if soil is dry. Water thoroughly and allow surface moisture to dry before installing sod. Do not create a muddy soil condition.

C. The sod shall be laid smoothly, edge to edge, and where continuous or solid sodding is specified on the Contract Documents, the sod shall be laid with the longest dimension parallel to the topographic contours. Vertical joints between sod pieces shall be staggered. Seams between sod pieces MUST be firmly abutted to each other. Spaces between seams are unacceptable.

D. Immediately after laying, the sod shall be pressed firmly to the topsoil bed below by light rolling or other approved methods so as to eliminate air pockets, provide true and even surfaces, ensure knitting and protect all exposed sod edges. Extreme care is required to avoid displacement of the sod or the deformation of the topsoil layer below.

E. Installed sod shall be watered immediately during and after installation to prevent drying. It shall then be thoroughly irrigated to a depth sufficient that the underside of the new sod pad and the soil immediately below the pad are thoroughly wet.

F. All sod must be installed within 24 hours of harvest.

3.04 MAINTENANCE

A. Begin maintenance immediately after sodding. If seeded in the fall, continue maintenance the following spring until acceptable lawn conditions are established.

B. Continually water to ensure proper sod establishment and to keep the surface of the sod bed and the topsoil layer below damp. Continue watering new sod until acceptance by the Owner. Apply water slowly so that the surface of the soil will not puddle.

C. Cut grass for the first time when it reaches a height of 2½" and maintain a minimum height of 2". Do not cut more than 1/3 of the blade at any one mowing. Remove clippings.

D. Apply herbicide as soon as weeds germinate, during calm weather when the air temperature is above 50 degrees F. using a licensed applicator to apply the herbicide. When using herbicides, apply in accordance with the manufacturer's instructions.

E. Resod damaged grass areas showing root growth failure, deterioration, bare spots and eroded areas.

F. Refertilize newly sodded areas 28 days after the initial seeding. Apply a minimum of one pound of nitrogen per 1000 square feet of sod area. Use a complete fertilizer with a 1-2-1 ratio or as recommended by soil test results.

3.05 CLEANUP AND PROTECTION

A. During landscape construction and sodding work, keep pavements clean and the project area in an orderly condition.

B. Protect sodded areas and materials from damage due to landscape operations, operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape construction as directed.

3.06 INSPECTIONS AND FINAL ACCEPTANCE

A. When required maintenance work and sod establishment is completed, request the Architect to make an inspection to determine acceptability. Final acceptance of lawn areas will be granted when a uniform stand of acceptable grass is obtained, with 100% of the sod being firmly "knit" to the topsoil layer below.

B. Where inspected sodding installation does not comply with the requirements of the Contract Documents, repair rejected work. The Contractor's maintenance responsibility shall continue until reinspected by the Architect and found acceptable. Maintenance responsibilities shall include refertilization, watering and mowing of sodded areas.

END OF SECTION 329223

SECTION 329300 - EXTERIOR PLANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inspection of plant material
B. Preparation for planting
C. Installation of plants
D. Follow-up inspections and replacements of plants

1.02 RELATED SECTIONS

A. Section 311001 – Earthwork-Site Work
B. Section 329200 – Turf and Grasses
C. Section 329223 – Sodding

1.03 REFERENCES

A. Plant Nomenclature: Conform to the latest edition of "Standardized Plant Names" as adopted by the American Joint Committee of Horticultural Nomenclature.

B. Size and Grading Standards: Conform to the current edition of "American Standard for Nursery Stock" by the American Association of Nurserymen, Inc., unless otherwise specified.

1.04 DEFINITIONS

A. Weeds: Vegetative species other than specified species to be established in given area.

B. Plants: Living trees, shrubs, perennials, ground cover, and other plant material specified in this section.

1.05 SUBMITTALS

A. Comply with the requirements of Section 013300 – Submittal Procedures and as modified below.

B. List of plants: Before plant material is shipped to the project site, submit a complete itemized list of all plants including the source of supply.

C. Product Data: Furnish the following with each planting material delivery:

1. Invoice indicating sizes and varieties of plant material.
2. Certificates of inspection required by State and Federal agencies.
3. Labels for each plant or bundles of plants indicating name and size.

D. Quality Control Submittals

1. Experience Listing: Submit a list of completed projects including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.
2. Planting Soil Analysis Report: Submit planting soil analysis report for on-site stockpiled or imported planting soil. Do not mix or utilize planting soil until a soil analysis report is approved by the Architect.

a. Provide required representative samples of planting soil materials proposed for use in the project to an independent testing agency for analysis and recommended treatment. Contractor shall pay for all costs incurred for testing and analysis of the soil material.
b. Ensure test reports include specific recommendations regarding exact types, times and rates of application of soil additives and fertilizers based upon soil test results and type of material to be planted. Follow soil additive recommendations during all planting operations. Include the following in the planting soil analysis:

(1) pH factor
(2) Percent organic matter
(3) Soluble salts

(4) Available macro and micronutrients
(5) Percent clay, sand and silt particles

c. Include in recommendations the type, rate and means of application of soil amendments and fertilizer necessary to establish the required pH factor, organic matter content and supply of nutrients satisfactory for planting.
d. All materials and procedures regarding soil amendments and fertilizers specified in this section are approximate; adjust all soil amendments to comply with the test reports.

E. Contract Closeout Submittals: Comply with the requirements of Section 017700.

1.06 QUALITY ASSURANCE

A. Worker's Qualifications: The person's performing the planting and their direct supervisor shall be personally experienced in the planting and caring of plant material. On site supervisory personnel shall have been employed by the company engaged in the planting and caring for a minimum of two years. All other individuals on the landscape crew must have a minimum of six months experience in the landscape contracting industry.

B. Tree Caliper

1. Trees up to four inches in caliper shall be sized at a point six inches above the top of the root ball.
2. Trees over four inches in caliper shall be sized at a point 12 inches above the top of the root ball.

C. Inspection: The Architect reserves the right to inspect plant material either at the nursery or on the project site before planting for compliance with the requirements for name, variety, size and quality.

1.07 DELIVERY, STORAGE AND HANDLING

A. Notify the Owner's Representative a minimum of 48 hours in advance of delivery of plant material.

B. Do not make substitutions. If specified plant material is not obtainable, submit to the Project Designer proof of non-availability and a proposal for use of equivalent material. When authorized, adjustment of the contract amount will be made.

C. Protect plant material against climatic and mechanical injury.

D. Acceptance of Plant Material at the Project Site

1. Provide freshly dug trees and shrubs. Do not prune prior to delivery. Do not bend or bind tie trees or shrubs in such a manner as to damage bark, break or destroy the natural shape of the plant material. Provide protective covering during delivery.
2. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than six hours after delivery, set trees and shrubs in the shade, protect from weather and mechanical damage and keep roots moist.
3. Label at least one tree and shrub of each variety with a securely attached waterproof tag bearing a legible description of the botanical and common name of the plant material.
4. Reject plants when the ball of earth surrounding the roots has cracked or broken prior to or during the planting process.
5. Reject plants when burlap, staves, and ropes required in connection with transplanting have been displaced prior to acceptance.

E. Deliver fertilizer in the manufacturer's standard sized bags showing the weight, analysis, and manufacturer's name. Store all fertilizer under a waterproof cover or in a dry place.

1.08 PROJECT CONDITIONS

A. Water: If available on the site, water will be supplied for the purpose of watering newly planted material at no cost to the contractor. If water is not available on site, the contractor shall supply water at their own cost as required for to maintain the health of the newly planted material.
B. Utilities: Determine the location of underground utilities and perform work in a manner avoiding possible damage, including required hand excavation. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Owner's Representative before planting.

1.09 PESTICIDE APPLICATIONS

A. Any contractor applying pesticides must notify the Owner's designated pesticide representative and all property neighbors not less than 48 hours in advance of any pesticide application including herbicides, insecticides and fungicides in accordance State Regulations and the School Pesticide Neighbor Notification Law, Section 409-H of the New York State Education Law and Commissioner's Regulation 155.24.

1.10 PLANTING GUARANTEE

A. The plant guarantee shall extend for a period of one full year from the date of substantial completion of the work. Substantial completion for the work of this section is the date when all planting operations or seasonal portions of the planting operations or replacement operations have been completed and are accepted by the Owner's Representative or the Project Designer.

1. The Contractor shall arrange for and conduct a final inspection with the Owner or the Owner's Representative at the end of the one-year guarantee period.
2. Replace plant materials found dead or in an unhealthy or unsightly growing condition and that have lost their natural shape due to dead branches or other causes due to the Contractor's negligence at the Contractor's expense.
3. Replace with plant materials of the same size and species and with a new guarantee period commencing on the date of replacement.
4. Provide maintenance and additional watering for an additional 12 month period.

PART 2 PRODUCTS

2.01 PLANT MATERIALS

A. Shrubs and Trees: The Contractor shall provide plant material complying with the following:

1. Nursery grown stock as indicated in the itemized plant list or on the Contract Documents complying with the recommendations and requirements of ANSI Z60.1 "Standard for Nursery Stock" and as specified.
2. Acclimated plants true to genus and species grown in recognized nurseries in accordance with good horticultural practices.
3. Well developed root and branch systems. Do not prune branches before delivery.
4. Free of disease, insect eggs, bark abrasions, frost cracks, dead or broken branches and disfiguring knots.
5. Buds intact and reasonably closed at the time of planting.
6. Balled and burlapped from soil which will hold a natural ball. Manufactured balls are unacceptable.
7. Conform to size indicated or larger, or within the minimum/maximum size when so indicated. Larger plants cut back to specified dimensions will not be acceptable.
8. Specified trees shall have a single erect leader from ground to top, surrounded with uniformly arranged branches unless specifically noted otherwise.
9. Transplanted or root pruned 360 degrees at least once during the previous three years.

2.02 PLANTING SOIL

A. Use either approved planting soil imported to the project site or approved on-site topsoil stripped, stockpiled and amended to meet the required specifications.

1. Topsoil for Planting Soil meeting the following specifications: Sand 35%-60%, Silt 30%-35%, and Clay 10%-25%.

B. Soil Amendments (For every 4CY of topsoil):

1. Peat Moss: 7½ CF bale (Approved compost material may be used as a substitute to peat moss).
2. Fertilizer: 5lbs.

2.03 FERTILIZER

A. 10-6-4 Commercial Fertilizer: Containing not less than 10% nitrogen, 6% available phosphoric acid and 4% water soluble potash. (Existing topsoil analysis shall be utilized to verify the actual fertilizer analysis to be used in this project)

2.04 MULCH

A. Shredded Hardwood Mulch: Wood fiber produced from hardwood trees, free of tannic acid, leaves, young green growth, wood shavings, sawdust or other objectionable foreign material.

2.05 MISCELLANEOUS MATERIALS

A. Stakes, Deadmen and Guy Stakes: Sound, durable white or red cedar or other approved wood, free of insect and fungus infestation.

B. Guy Wire or Cable: No. 12 galvanized wire or cable.

C. Tree Wrapping: 4 inch wide strips of jute burlap or waterproof paper.

D. Protective Hose: Two-ply garden hose cut to required lengths to protect tree trunks from damage from wire.

E. Anti-Desiccant: Emulsion type, film forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with the manufacturer's instructions; similar to "Wilt-Pruf" by Wilt-Pruf products, Essex, CT.

F. Landscape Fabric: Weather resistant, polypropylene sheeting complying with the permeability coefficient 0.0028 or 2.845 gal./sf/minute, minimum 30 mil thick; similar to "Weed Barrier" by DeWitt Co., Inc., Sikeston, MO.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which landscape planting is to be completed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Architect shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.

1. When the Installer confirms conditions as being acceptable, to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Architect. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the Installer.

3.02 PREPARATION

A. Planting Layout:

1. Stake out all tree locations and planting areas.
2. Obtain layout approval from the Owner's Representative prior to excavations of plant pits and beds.

B. Plant Pit Dimensions:

1. Balled and Burlapped Plants: Pit depth should not exceed the ball depth. The pit width measured at the ground surface shall be three times the width of the ball or as indicated.
2. Container Grown Plants: Two times the diameter of the container measured at the ground surface.
3. Ground Cover Beds: Excavate the entire planting bed to a depth of 4" and replace with amended planting soil.
4. Bare Root Plants: Diameter equal to the width of the roots spread to their natural position plus 24 inches, measured at the ground surface.
5. Hedge Trenches: 18 inches wide and 18 Inches deep.

C. Excavation: Excavate pits to the dimensions specified. Dispose of excavated material of the site unless otherwise directed.

3.03 PLANT INSTALLATION

A. Setting Plants

1. Backfill pits with planting soil and firm to the level upon which plants were previously growing. Set plants plumb. Plant budded or grafted plants two inches below the bud or graft line. Complete backfilling with planting soil and settle continually with water.
2. Balled Plants: Set plants in position and backfill 1/3 depth of ball. Remove burlap from the top and adjust to eliminate air pockets. Remove all metal caging and synthetic twine. Complete backfill and settle with water.
3. Bare-Root Plants: Set plant in position and place planting soil around roots settling with water. Use care to avoid bruising or breaking roots when firming the soil. Prune bruised or broken roots

B. Wrapping: Wrap deciduous trees within four days after planting from the ground line to the height of the second branches. Wrap in a single layer wound spirally starting from the base and overlapping 1½ inches. Secure wrapping in place by use of approved staples or other approved methods and materials.

C. Staking: Set tree stakes into solid ground below the bottom of the plant before backfilling. Place stakes at the outer edge of the roots or ball in line with the prevailing wind at a ten degree angle from the tree trunk.

D. Anti-Desiccant: Apply anti-desiccant spray to broadleaved ericaceous plants installed in the Fall season, as directed.

E. Landscape Fabric: Install over the planting area to the limits indicated. Cut fabric as required to avoid plants.

F. Surface Finish: Form saucer as indicated on drawings or as directed. Grade soil to form a basin on the lower side of sloped plantings, which will catch and retain water. Topdress basins with fertilizer spread evenly at a rate of 1½ pounds per square yard of plant pit surface.

G. Mulching: Spread a minimum of 4” of shredded hardwood mulch over the finished surface of each plant, plant bed or hedge trench. Water plants thoroughly after mulching is complete.

H. Pruning: Prune plant material immediately after planting using sharp tools approved by the Owner’s Representative. Remove approximately 1/3 of the wood of deciduous plants, maintaining the natural habit of the plant. Cut no leaders.

I. Guying: Secure deciduous trees two inches and over in caliper, multi-stemmed trees six feet and over in height, and evergreen trees six feet and over in height with minimum three guys. Attach guy wires with protective hosing to stakes and trees as indicated. Connect multi-stemmed trees with protected wires maintaining each stems relationship to one another.

J. Establishment of Planting: Maintain plantings immediately following planting operations and continue throughout the warranty period. Establishment of plantings shall consist of keeping plants in healthy growing conditions by watering, weeding, cultivating, pruning, spraying, tightening of guys, remulching and by any other necessary operations for establishment. Water all plants at least once a week between April 1 and October 31 with approximately five gallons of water per square yard (one inch layer of water) per watering unless otherwise directed by the Owner’s Representative. Provide additional water during periods of dry weather when required or when directed. Treat plants with sound horticultural preventative or remedial measures to control insects, diseases and rodents.

K. Weeding: Schedule maintenance work at least three times during the growing season of the 12 month warranty period to keep planting areas free from weeds. Coordinate maintenance work with the Owner’s Representative.

3.04 CLEANUP AND PROTECTION

A. During landscape construction work, keep pavements clean and the project area in an orderly condition.

B. Protect landscape construction and materials from damage due to landscape operations, operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape construction as directed.

3.05 INSPECTIONS AND REPLACEMENTS

A. Substantial Completion Inspection and Replacements: Notify the Owner's Representative in writing at least ten days prior to the requested date of planting substantial completion inspection. Remove and replace dead, unhealthy, or badly impaired plants according to the original specification, if so directed. Replace plants during the next planting season if this inspection is not within a planting season.

B. End of Warranty Inspection and Replacements: Remove stakes, guy wires and tree wrapping at the end of the one-year warranty period unless otherwise directed. Remove and replace dead, unhealthy or impaired plants according to the original specifications, as directed. Replace plants during the next planting season if this inspection is not within a planting season.

END OF SECTION 329300

SECTION 331000 - WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for combined water service and fire-service mains.

1.3 DEFINITIONS

A. HDPE: High Density Polyethylene plastic.

B. DIP: Ductile Iron Pipe

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of the Veolia North America including tapping of water mains.
2. Comply with standards of the Veolia North America for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards the Thiells Fire Department for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

D. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

E. NSF Compliance:
1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Owner's written permission.

1.8 COORDINATION

A. Coordinate connection to building with plumbing contractor.

B. Water Connection and Service: Coordinate and arrange for connection to the existing water main with the Owner and operator of the existing water distribution system.
1. Provide all products, materials and services required for the complete installation, testing, disinfection, and activation of the indicated water service.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

A. Pipe:
1. Centrifugally cast in accordance with ANSI/AWWA C151/A21.51.
2. Working Pressure: 150 psi

3. Pressure Class: 350 psi
4. Joints: Push-on, ANSI/AWWA C111/A21.11
5. Laying Length: 18 or 20 feet.

B. Fittings:
1. Cast or Ductile Iron: ANSI/AWWA C110/21.10, or ANSI/AWWA C153/A21.53 ductile iron compact fittings.
2. Joints: Mechanical, ANSI/AWWA C111/A21.11
3. Working Pressure: 250 psi, if ANSI/AWWI C110/A21.10 fittings are used or 350 psi if ANSI/AWWA C153/A21.
4. All fittings shall include the appropriate accessories required for installation.

C. Lining and Coating:
1. All ductile iron pipe and fittings shall be furnished with a seal coated cement mortar lining conforming to ANSI/AWWA C104/A21.4, except that the lining thickness shall be twice the standard thickness and never less than 1/8 inch.
2. Buried pipe and fittings shall be furnished with a 1 mil thick standard petroleum asphaltic coating conforming to ANSI A21.51, and shall be wrapped with polyethylene film in accordance with ANSI/AWWA C105/A21.5.

2.2 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

2.3 HIGH DENSITY POLYETHYLENE (HDPE) TUBING

A. High-density Polyethylene (HDPE), AWWA Tubing: AWWA C901/C906, DR 11 iron pipe size (IPS).

B. Tubing Material: PE 3408 High Density Polyethylene (HDPE) meeting ASTM D 3350 cell classification of 334434-C.

C. Tubing: Potable Water Tubing (DR-PR) based on controlled outside diameter and IPS size criteria: ASTM D 2737.

D. Tubing shall be DR-11 pressure rated at 200 PSI according to ASTM D 2737 at 23 degrees C (73.40 F) and of the size shown on the drawings.

E. HDPE, AWWA Fittings: AWWA C906 socket- or butt-fusion type, with DR number matching pipe and PE compound number required to give pressure rating not less than 200 psi.

2.3 GATE VALVES

A. AWWA, Ductile-Iron Gate Valves:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.
c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
d. Crane Co.; Crane Valve Group; Stockham Div.
e. East Jordan Iron Works, Inc.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.

h. McWane, Inc.; M & H Valve Company Div.
i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
j. Mueller Co.; Water Products Div.
k. NIBCO INC.
l. U.S. Pipe and Foundry Company.

2. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
   a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
      1) Standard: AWWA C509 or AWWA C515.
      1) Minimum Pressure Rating: 250 psig (1725 kPa).
      2) End Connections: Mechanical joint conforming to ANSI A21.11.
      3) Interior Coating: Complying with AWWA C550.
      4) Valves shall open right (clockwise), compatible with Veolia North America standard with a standard 2-inch square operating nut with arrow cast on it showing the direction of opening.
      5) Each valve shall be furnished complete with necessary nuts, bolts, studs, and gaskets.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
   1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.4 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies Valves:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
      b. East Jordan Iron Works, Inc.
      c. Flowserve.
      d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
      e. McWane, Inc.; Kennedy Valve Div.
      f. McWane, Inc.; M & H Valve Company Div.
      g. Mueller Co.; Water Products Div.
      h. U.S. Pipe and Foundry Company.
   2. Description: Sleeve and valve compatible with drilling machine.
      a. Standard: MSS SP-60.
      b. Tapping Sleeve: Stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
      c. Valve: AWWA C515, ductile-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange. Valves shall open right (clockwise), compatible with Veolia North America standard with a standard 2-inch square operating nut with arrow cast on it showing the direction of opening.

2.4 CURB VALVES

A. Available Manufacturers:

   1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. Amcast Industrial Corporation; Lee Brass Co.
      b. Ford Meter Box Company, Inc. (The); Pipe Products Div.
      c. Jones, James Company.
      d. Master Meter, Inc.

e. McDonald, A. Y. Mfg. Co.
f. Mueller Co.; Water Products Div.
g. Red Hed Manufacturing & Supply.

B. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping size.

C. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.

2.4 PROTECTIVE ENCLOSURE

A. Basis of Design Product: Subject to compliance with requirements, provide model 'HA026070055' by Hotbox or a comparable product by one of the following:
1. Watts Water Technologies
2. BF Products, Inc.

B. Description: Enclosure designed to protect aboveground water piping, equipment, or specialties from weather and damage.
1. Standard: ASSE 1060 certified.
2. Enclosure shall be designed to support a minimum vertical load of 100lb/sf.
3. Drain port sized for full port backflow discharge (160 gpm minimum) and are designed for a one-way operation allowing backflow discharge but not allowing wind, debris, and small animals to enter the enclosure.
4. Insulation shall be approximately 1.5" unicellular, non-wicking, polyisocyanate foam sprayed in place that forms a monolithic bond between the aluminum bracing and aluminum sheeting.
5. Heating equipment (ASSE 1060 Class I).
   a. Heating equipment shall protect piping and equipment from exterior temperatures to -30 deg. F. ETL listed thermostatically controlled wall mounted air forced heaters shall be furnished and designed by the manufacturer of the enclosure to maintain the equipment at +40 deg F, in accordance with ASSE 1060 1.2.2.1.
   b. Power source shall be protected with a GFI receptacle, U.L. 943, NEMA.3R. Mounted a minimum of 8" from the bottom of the receptacle to the top of the slab.

C. Enclosure Bases:
1. Description: 4-inch minimum thickness precast concrete, of dimensions required to extend at least 9 inches beyond edges of enclosure housing. Include openings for piping.

2.5 DOUBLE CHECK VALVE

A. Basis-of-Design: Watts 709DCDA backflow preventor or approved equal.

2.6 YARD HYDRANT

A. Frost proof yard hydrant: Hydrant shall be a freeze-less above ground yard hydrant with tamper proof lock and backflow preventer. Bury depth shall be 5' below grade. Basis-of-design product Woodford Model Y34 with Woodford model 50H-BR backflow preventer.

2.7 FIRE HYDRANTS

A. Dry-Barrel Fire Hydrants:

1. Hydrants shall be compression-type fire hydrants, as manufactured by Mueller and be in conformance with Thiells Fire Department requirements, Mueller Super Centurion A-423 with 4" Storz connection.
2. Conform to the latest revision of AWWA C502.
3. Fire hydrants are to have a 5-1/4 inch main valve opening and a 6 inch mechanical joint inlet connection.
4. Suitable for a 5 feet minimum depth of bury, or greater, as required by waterline depth.
5. Provide one 5-1/4 inch pumper connection with 4" STORZ Connection and two 2-1/2 inch hose connections with National Standard hose threads and outlet nozzle caps and chains. The outlet nozzle cap nuts are to be the same in size and dimensioning as the operating nut.
6. All fire hydrants are to be of break flange construction with a frangible break flange located slightly above the ground line and a cast-iron break coupling on the stem at the same location, which is to be so designed that in case of breakage, only the break flange and cast-iron coupling need be replaced to complete repair.
7. Stems with nuts are to open by turning right (clockwise). An arrow and the word "open" is to be cast on the top of the hydrant.
8. All hydrants shall include the appropriate accessories required for installation.

B. Hydrant Leads:

1. Valve: 6 inch, M.J. gate valve meeting the requirements of Section 2.5 "Gate Valves".
2. Anchoring Tee: Mechanical joint anchoring tee, water main diameter x 6 inch with roto-ring glands.
3. Anchoring Pipe: Mechanical joint anchoring pipe, 6-inch with roto-ring glands.

C. Paint:

1. Hydrants shall be yellow with a blue bonnet for 6-inch main or forest green bonnet for 8-inch main.
2. All hydrants shall be furnished completely shop primed and with one (1) finish coat of the specified color(s).
3. Both the shop finish coat and field finish coat shall be a weather resistant, high gloss enamel, "New Color Horizons System" by Rust-Oleum, or equal.
4. Contractor shall provide paint for one finished coat after installation.

2.5 JOINING MATERIALS

A. Refer to Division 22 Section "Common Work Results for Plumbing" for commonly used joining materials.

2.6 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Section 312000 "EARTHWORK-SITE" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 22 Section "Common Work Results for Plumbing" for piping-system common requirements.

3.5 PIPING INSTALLATION

A. Bury piping with depth of cover over top at least 60 inches, with top at least 12 inches below level of maximum frost penetration.

B. Water-main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

C. Make connections larger than NPS 2 with tapping machine according to the following:
1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

D. Make connections NPS 2 and smaller with drilling machine according to the following:
1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
2. Install service-saddle assemblies on water service pipe to be tapped. Position outlets for corporation valves.
3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water service piping.
4. Install corporation valves into service-saddle assemblies.
5. Install curb valve in water service piping with head pointing up with service box.

E. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

F. HDPE piping shall be installed in strict accordance with the manufacturer’s instructions and ASTM D 2774.

G. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

H. Place selected material and thoroughly compact as specified in Section 312317 - SITE TRENCHING.

I. See Division 22 Section "Domestic Water Piping" for potable-water piping inside the building.

3.6 JOINT CONSTRUCTION

A. See Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

1. Pipe with Heat Fused Joints: Install in accordance with ASTM D 2657.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.

3.7 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.9 YARD HYDRANT

A. Install in accordance with manufacturer’s recommendations.

3.10 FIRE HYDRANT INSTALLATION

A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

B. AWWA Fire Hydrants: Comply with AWWA M17.

C. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.11 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. See Division 22 Section "Common Work Results for Plumbing" for piping connections to valves and equipment.

C. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

3.12 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 150 psi for two hours. Remake leaking joints with new materials and repeat test until leakage is within allowed limits. Leakage shall not exceed 2 quarts per hour per 100 joints.

C. Prepare reports of testing activities.

3.13 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "EARTHWORK-SITE."

3.14 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    b. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    c. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 331000

SECTION 333000 - SANITARY SEWER SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes furnishing all labor, materials, equipment, and services required to complete and make fully functional, the work indicated on the Contract Drawings and as described in the Contract Documents. Work includes, but is not limited to the following:

1. Furnishing all work not required in other sections to complete and make operational the sewer system outside the building.
2. Sanitary sewer gravity and pressure piping.
3. Connections to the building sewer laterals after the cleanout.

1.2 RELATED DOCUMENTS

A. Excavation, bedding and backfill required for pipe and manhole installation is specified in Division 31 Specification Section 312000 “Earthmoving”.

1.3 SUBMITTALS

A. General: Submit each item to be used as part of the work for this section according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop drawings: Submit shop drawings and product data for sanitary sewer systems, showing piping materials, size, locations, and inverts. Include details of underground structures connections, and cleanouts.

C. Record Drawings: At project closeout, submit Record Drawings of installed sanitary sewerage piping and products, in accordance with requirements of General Conditions.

D. Inspection and test reports are specified in sub section 3.10, Field Quality Control.

1.4 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Firms regularly engaged in manufacture of sanitary sewerage and drainage system products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Installer Qualifications: Firm with at least three (3) years of successful installation experience on projects with sanitary sewerage and drainage work similar to that required for Project.

C. Codes and Standards:

1. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of sanitary sewerage system materials and products.
3. New York State Regulation Compliance: Comply with the rules, regulations and standards of the New York State Department of Health (NYSDOH) and the New York State Department of Environmental Conservation (NYSDEC) pertaining to sanitary sewer systems.

1.5 PROJECT CONDITIONS

A. Refer to utility plans of Contract Drawings pertaining to existing above ground and underground utilities.

B. Field verify conditions at existing manholes or sanitary lines to remain which are scheduled to connect with proposed structures or pipes. Notify the Owners Designated Representative of any conditions varying from those indicated on the survey.

C. Interruption of Existing Sanitary Sewer Service: Do not interrupt sanitary sewer service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sanitary sewer service according to requirements indicated:

2. Notify Construction Manager no fewer than two days in advance of proposed interruption of sanitary sewer service.
3. Do not proceed with interruption of sanitary sewer service without Construction Manager's written permission.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe or fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate sanitary sewerage system connections to related structures and building piping.

B. Coordinate with interior building drainage systems to avoid conflicts.

C. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PVC PIPES AND FITTINGS

A. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 3034, SDR 26 gravity sewer pipe, non-perforated, for elastomeric gasket joints.

1. Gaskets: ASTM F 477, elastomeric seal.

2.2 SPECIAL PIPE COUPLINGS AND FITTINGS

A. Sleeve-Type Pipe Couplings: Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined, for nonpressure joints.

1. Sleeves for Cast Iron Soil Pipe: ASTM C 564, rubber.
2. Sleeves for Plastic Pipe: ASTM F 477, elastomeric seal.
3. Sleeves for Dissimilar Pipes: Compatible with pipe materials being joined.
4. Bands: Stainless steel at least one at each pipe insert.

B. Gasket-Type Pipe Couplings: Rubber or elastomeric compression gasket, made to match outside diameter of smaller pipe and inside diameter or hub of adjoining larger pipe, for nonpressure joints.

1. Gaskets for Cast Iron Soil Pipe: ASTM C 564, rubber.
2. Gaskets for Plastic Pipe: ASTM F 477, elastomeric seal.
3. Gaskets for Dissimilar Pipes: Compatible with pipe materials being joined.

2.3 CLEANOUT TO GRADE

A. Cleanout as detailed on Construction Drawings. Cleanout shall be Polyvinyl Chloride (PVC) with a ferrous metal cleanout cap. Lettering on cover to read “SEWER”.

1. Available manufacturers:
   a. Neenah Foundry Company, No. 1975-A, 2121 Brooks Ave., Neenah, WI 54956, (800) 558-5075.
   b. Syracuse Castings Company, No. 4155, 6177 South Bay Road, Cicero, NY 13039, (315) 699-2982.
   c. Or approved equal.

2.4 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33 crushed gravel.
4. Water: Potable.

PART 3 - EXECUTION

3.1 GENERAL

A. Work of this part shall include furnishing all required materials, manpower, tools and equipment necessary to complete the installation of the Sanitary Sewer System as described herein and shown on the drawings and shall include all materials described in Part 2 unless approved otherwise in advance in writing.

3.2 EARTHWORK

A. Excavating, trenching and backfilling are specified in Division 31, Section 312000 “Earthwork-Site.”

3.3 IDENTIFICATION

A. Materials and their installation are specified in Division 31, Section 312000 “Earthmoving.” Furnish and install green warning tapes directly over piping at proper depth for location by detection equipment and at outside edges of underground structures.

1. Use warning tapes or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.4 SANITARY SEWER PIPING APPLICATIONS

A. General: Include watertight joints.

B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and

joining methods according to the following applications.

1. Pipe Sizes: 4 and 6 inches: Polyvinyl chloride (PVC) sanitary sewer pipe and fittings; with gaskets and gasketed joints.

3.5 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

A. Special Pipe Couplings: Use where indicated and where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

1. Use the following pipe couplings for nonpressure applications:
   a. Straight-pattern, sleeve type to join piping, of same size, with small difference in outside diameters.
   b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
   c. Gasket type to join piping of different sizes where annular space between smaller piping's outside diameter and larger piping's inside diameter permits installation.
   d. Internal-expansion type to join piping with same inside diameter.

3.6 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sanitary sewer systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.

B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

C. Use fittings for branch connections, except where direct tap into existing sanitary sewer is indicated.

D. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

E. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.

3.7 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to the following.

1. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings: As follows:
   a. Join solvent-cement-joint pipe and fittings with solvent cement according to ASTM D 2855 and ASTM F 402.
   b. Join pipe and gasketed fittings with elastomeric seals according to ASTM D3212.
2. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and fit both systems' materials and dimensions.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

3.9 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as the work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plug in end of incomplete piping at end of day and whenever work stops.
3. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of the Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:
    a. Alignment: Less than full diameter of inside of pipe is visual between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
    c. Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into sanitary sewerage piping.
    e. Exfiltration: Water leakage from or around sanitary sewerage piping.
3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

END OF SECTION 333000

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SECTION 334100 - STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes furnishing all labor, materials, equipment and services required to complete and make fully functional, the work indicated on the Contract Drawings and as described in the Contract Documents. This Section includes but is not limited to the following:
   1. Storm drainage pipes.
   2. Drain Inlets
   3. Catch basins.
   4. Yard drains.
   5. Trench drain
   6. Collector drain, flat drain and accessories (synthetic turf field)

1.2 RELATED DOCUMENTS

A. Excavation, pipe bedding and backfill, filter fabric, underground warning tape and riprap at flared end sections are specified in Division 31 Specification Section 312000 “Earthwork-Site”.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract.

B. Shop Drawings:
   1. Manholes, catch basins, and drain inlets: Include plans, elevations, sections, details, frames, and covers.

C. Record Drawings: At project closeout, submit Record Drawings of installed storm drainage piping and products in accordance with requirements of General Condition.

D. Inspection and test reports specified in the "Field Quality Control" Article specified herein.

1.4 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Firms regularly engaged in manufacture of drainage system products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Installer Qualifications: Firm with at least three (3) years of successful installation experience on projects with drainage work similar to that required for Project.

C. Codes and Standards:
   1. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of storm drainage system materials and products.
   3. New York State Regulation Compliance: Comply with the rules, regulations and standards of the New York State Department of Health (NYSDOH) and New York State Department of Environmental Conservation (NYSDEC) pertaining to storm drainage systems.

1.5 DEFINITIONS

A. Storm Drainage Piping: System of storm sewer pipe, fittings, and appurtenances for gravity flow of storm drainage water, surface and subsurface generated.

1.6 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: Silt-tight joints per ASTM F477 for HDPE Pipe.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures in direct sunlight.

B. Do not store plastic pipe or fittings in direct sunlight.

C. Protect pipe, pipe fittings, and seals from dirt and damage.

D. Handle precast concrete catch basins and any other structures according to manufacturer's rigging instructions.

1.8 PROJECT CONDITIONS

A. Refer to utility plans of Contract Drawings pertaining to existing above ground and underground utilities.

B. Contractor shall obtain and pay for all permitting, inspection and connection fees associated with this project.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate with interior building drainage systems. Site storm drainage contractor shall be responsible for connection to the building drainage system.

B. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. Corrugated, High Density Polyethylene (PE) Drainage solid or perforated, as noted on plans, double wall smooth interior pipe: AASHTO M 252 Type S, for 3 inch to 10 inch diameter, AASHTO M 294 Type S, for 12 inch to 48 inch diameter.
   1. Couplings: ASTM D 3350 and AASHTO M294, high density polyethylene sleeve with ASTM D 1056 Type 2, Class A, Grade 2 gasket material that mates with pipe and fitting for silt-tight joints.

B. Corrugated Metal Pipe (CMP), aluminized steel Type 2 conforming to AASHTO M 274 or ASTM A929, manufactured in accordance with AASTM M 36 and ASTM A760.
   1. Coupling bands shall be made of the same base metal and coatings as the pipe to a minimum of 18 gauge.

2.2 INLINE DRAIN

A. Polyvinyl chloride (PVC) pipe stock, utilizing a thermos-molding process to reform the pipe stock to the specified configuration.

B. Drainage pipe connection stubs shall be manufactured form PVC pipe stock and formed to provide a watertight connection with the specified pipe system. Joint tightness shall conform to ASTM D3212.

C. Raw material used to manufacture the pipe stock shall conform to ASTM D1784 cell class 12454.

D. Frame and grates: Grates shall be capable of supporting H-20 wheel loading for traffic areas or H-10 loading for pedestrian areas. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron, painted black, manufactured to fit specified PVC riser fitting. Grates shall be pedestrian style and lockable.

2.3 YARD DRAINS

A. Polyvinyl chloride (PVC) inlet drains, risers, and catch basins: ASTM F 794, F 979 and F 1336 mechanical property requirements for fabricated fittings, of dimensions, pipe connections, orientations, and depth indicated:

   1. Structures: PVC pipe stock reformed utilizing a thermo-molding process with specified inlet & outlet pipe connection stubs and risers sized to fit specified frame and grate.
   2. Diameter: 18 inches minimum, larger as required based on pipe angles and sizes.
   3. Joints: Fabricated fittings shall conform to ASTM D 3212 for watertight connections.

B. Frame and grates: Grates shall be capable of supporting H-20 wheel loading for traffic areas or H-10 loading for pedestrian areas. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron, painted black, manufactured to fit specified PVC riser fitting. Grates shall be pedestrian style and lockable.

2.4 CATCH BASINS AND MANHOLES

A. Precast Concrete Catch Basin and Outlet Control Structures: ASTM C 478 precast, reinforced concrete, of depth indicated, with shiplap joints.
1. Diameter: 48 inches minimum.
2. Base Section: 8-inch minimum thickness for floor slab and 5-inch for walls and base riser section and having a base section with integral floor.
3. Riser Sections: 8-inch minimum wall thickness and lengths to provide depth indicated.
4. Top Section: Flat-slab-top traffic type as indicated.
5. Shiplap Joint Sealant: Butyl rope joint sealant; ASTM C990-91 and AASHTO M-198B.
6. Grade Rings: Include 2 or 3 pre-cast reinforced-concrete rings, of 8-inch total thickness each, that match inside diameter of top section opening.
7. Steps: ASTM C 478-85a and C497-85 individual steps manufactured of copolymer polypropylene plastic. Omit steps for catch basins less than 24 inches deep.
8. Pipe Connectors: ASTM C 923 cast or fitted into manhole walls, for each pipe connection.

B. Frame and Grates: ASTM 48/A 48M, Class 35, gray iron designed to meet AASHTO M306 loading. Include flat grate with small square drainage openings.
1. Size: 30 by 30 inches minimum unless otherwise indicated.
2. Frame Height: 4” minimum in traffic areas
3. Manufacturers:
a. Product 5419 from East Jordan Iron Works, Inc., Denver, CO.
b. Product 2816B from Campbell Foundry, Co., Harrison, NJ.
c. Or approved equal.

C. Frame and Cover (Manhole): ASTM 48/A 48M, Class 35 gray iron designated to meet AASHTO M306 loading
1. Size: 30 inch minimum inside diameter unless otherwise indicated.
2. Manufacturers:
a. Product 1558 from Neenah Foundry Company, Neenah, WI.
b. Product 1480 from East Jordan Iron Works, Inc., Denver, CO.
c. Product 1503 from Campbell Foundry Company, Harrison, NJ.

2.4 DROP INLETS

A. Precast square, reinforced concrete structures with integral base and accessories complying with the following:
1. Riser Sections: ASTM C 890, height and width as indicated on the Contract Documents.
2. Keyed joints between riser sections: Rubber gaskets per ASTM C 443 as recommended by the manufacturer.
3. Concrete for Pre-cast units: Air content 6% by volume with an allowable tolerance of +/-1.5%. Minimum compressive strength of 4000 psi after 28 days.
4. Pre-cast concrete structure load ratings: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

D. Frame and Grate: ASTM 48/A 48M, Class 35, gray iron designed to meet AASHTO M306 loading. Include flat grate with small square drainage openings.
1. Size: 30 by 30 inches minimum unless otherwise indicated.
2. Frame Height: 4” minimum in traffic areas, 6” minimum in non-traffic areas
3. Manufacturers:
a. Product 5419 from East Jordan Iron Works, Inc., Denver, CO.
b. Product 2816B from Campbell Foundry, Co., Harrison, NJ.
c. Or approved equal.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
1. Cement: ASTM C 150, Type II, Portland Cement.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C33 crushed gravel.
4. Water: Potable.

B. Structures: Portland-cement design mix, 4000-psi minimum, with 0.35 maximum Water-to-Cement (W/C) ratio.
   1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
   2. Reinforcement Bars: ASTM A 615, Grade 60 deformed steel.

2.7 END SECTIONS

A. High Density Polyethylene (HDPE) Units: Flared end section meeting ASTM D3350 standards, with minimum cell classification 213320C. Sections shall have carbon black additive for UV protection.

B. Threaded fastener: Stainless steel.

C. Size of section to correspond with size of pipe.

2.8 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials
   1. For plastic pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
   2. For dissimilar pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings: Couplings shall be an elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-type, flexible couplings shall be elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.9 SYNTHETIC TURF FLAT UNDERDRAIN

A. High density polyethylene (PE) drainage, perforated, oblong corrugated pipe specifically designed for subsurface drainage applications. Pipe, fittings and couplings shall meet ASTM D3550.

B. Outside dimensions shall be 1.5” thick by 13” wide.

C. Pipe core shall include geotextile wrap, 0_{95} of 0.212 mm and meet the following criteria:

Pipe		
Nominal Pipe Size	12”	
Slot Length (average)	1.125”	
Slot Width (average)	0.125”	
Water Inlet Area	15 in2/ft	
Filter Fabric		
Grab Tensile Strength	ASTM D4632	120 lbs
Grab Elongation	ASTM D4633	60%
Trapezoidal Tear	ASTM D4533	40 lbs
Puncture	ASTM D3786	30 lbs
Permittivity	ASTM D4491	0.7 sec -1
AOS	ASTM D4751	60 U.S. Sieve Size
U.V. Resistance	ASTM D4355	70

D. Transition couplings: ASTM D 3350, high density polyethylene (PE) transition to circular pipe.

E. Shall be manufactured by ADS (AdvanEdge), 1800.821.6710 www.ads-pipe.com model 1472 AA-12” approved equal.

2.10 TRACK TRENCH DRAINS

A. D-Zone Areas: Pre-cast, interlocking polyester concrete, slot type trench drainage system as indicated on the Contract Documents and complying with the following:

   1. Physical and Mechanical Characteristics

a. Overall Width: 6.10”
b. Internal Width: 4.30”
c. Unit Depth: 9.80”
d. Unit Length: 39.37” (1 meter)
e. Slot Opening: 0.50”
f. Compressive Strength: 14,000 psi
g. Flexural Strength: 4,000 psi
h. Water Absorption Rate: Not to exceed 0.1% by weight
i. ADA Compliance: 1990 American Disabilities Act, Section 4.5.4

2. Channel Profile: Standard units shall include positive interlocking tongue and groove connections that can be sealed to provide watertight connections. Each one meter pre-cast polymer unit shall have a 0.5” longitudinal evacuation slot and have horizontal cast-in features on outside walls to ensure mechanical bond to surrounding bedding material.

3. Radius Channels: Channels scheduled for installation on track curve areas shall be manufactured to enable a 120’ radius per IAAF guidelines.

4. Catch Basins: Pre-cast, polymer, 19.69” long units, with trash bucket and removable cover.

5. Specifications have been based on “System 2000 Slot Channel Trench Drain System” manufactured by ACO Polymer Products/Sportsfield Specialties, Inc., Chardon, Ohio (Tel. #888-975-3343).

B. Straightaway Areas: Precast, interlocking polyester concrete, open type trench drainage system with interconnecting modular components as indicated on the Contract Documents and complying with the following:

1. Physical and Mechanical Characteristics

a. Overall Width: 6.10”
b. Internal Width: 4.00”
c. Unit Depth: 9.90”
d. Unit Length: 39.37” (1 meter)
e. Compressive Strength: 14,000 psi
f. Flexural Strength: 4,000 psi
g. Water Absorption Rate: Not to exceed 0.1% by weight
h. Integral thermoplastic elastomer (TPE) safety edge on field side of drain

2. Channel Profile: Standard units with full radius bottom including positive interlocking tongue and groove connections that can be sealed to provide watertight connections. Each one meter precast polymer concrete unit shall have a 0.5” longitudinal evacuation slot and horizontal cast in anchoring features on outside walls to ensure mechanical bond to surrounding bedding materials.

3. Catch Basins: Precast, polymer concrete, 19.69” (0.5 meter) long units, with trash bucket and removable cover.

4. Grate: Modular, UV stable polypropylene grate with boltless locking system and raised anti-slip surface complying with ADA 4.5.4, and the following:

a. Width: 4.84”
b. Length: 19.69”
c. Slot Configuration: 0.34” wide by 1.74” long
d. Certification: DIN 19580, Load Class A – 3500 lbs., 70 psi
e. ADA Compliance: 1990 American Disabilities Act, Section 4.5.4
f. Intake Area: 28 square inches per 19.69” section
g. Surface Detail: Raised, anti-slip.
h. Color: Black

5. Specifications have been based on “System 4020SE with Safety Edge Trench Drain System” manufactured by ACO Polymer Products/Sportsfield Specialties, Inc., Chardon, Ohio (Tel. #888-975-3343).

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching and backfilling are specified in Division 2 Specification Section 312000 “Earthwork-Site.”

3.2 DRAINAGE PIPING APPLICATIONS

A. General: Include silt tight joints as indicated.

B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.
   1. Pipe Sizes 8 to 48 Inches: AASHTO M 294 Interim, corrugated polyethylene (PE) plastic pipe and fittings; corrugated, silt-tight couplings: silt-tight coupled joints.
   2. Corrugated metal pipe shall be installed in accordance with AASHTO Standard Specifications for Highway Bridges, LRFD Section 26, Division II, NCSPA, or ASTM A798 and in conformance with the project plans and specifications.

3.3 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground storm drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.

B. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited, unless indicated otherwise on the Contract Drawings.

C. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than 1 percent, where slope is not indicated.

D. Extend drainage piping and connect to building's storm drains and footing drains, of sizes and in locations indicated. Terminate piping as indicated.

3.4 CATCH BASIN AND MANHOLE INSTALLATION

A. Construct all concrete structures to sizes and shapes indicated.

B. Set frames, grates and covers to elevations indicated.

C. Install piping according to manufacturer’s standard specifications.

3.5 TRENCH DRAIN INSTALLATION

A. Install with top surfaces of components, except piping, flush with finished surface, unless otherwise specified.

B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.

C. Install drains as recommended by the manufacturer and as depicted on the Construction Documents.

3.6 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below.

   1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
   2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Backfill to grade according to Section 31 20 00 “Earth Moving.”

3.7 CONNECTIONS

A. Make branch connections to underground manholes by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated.
   a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi.
   b. Use epoxy-bonding compound as interface between new and existing concrete and piping material.

B. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 SYNTHETIC TURF FLAT UNDERDRAIN

A. Underdrain piping shall be installed in accordance with these documents and both the pipe and synthetic turf manufacturers' specifications. Install perforated HDPE underdrain conduits at 15 feet on center at a 45-degree angle, or as indicated on plans.

3.9 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

3.10 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as the work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
   1. In large, accessible piping, brushes and brooms may be used for cleaning.
   2. Place plug in end of incomplete piping at end of day and whenever work stops.
   3. Flush piping between catch basins and other structures, if required by authorities having jurisdiction, to remove collected debris.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of the Project.
   1. Submit separate reports for each system inspection.
   2. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visual between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
      c. Crushed, broken, cracked, or otherwise damaged piping.
   3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
   4. Reinspect and repeat procedure until results are satisfactory.

C. Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects.
   1. Do not enclose, cover, or put into service before inspection and approval.
   2. Test completed piping systems according to authorities having jurisdiction.
   3. Schedule tests, and their inspections by authorities having jurisdiction, with at least 24 hours advance notice.
   4. Submit separate reports for each test.
   5. Where authorities having jurisdiction do not have published procedures, perform tests as follows:
      a. Storm Drainage: Perform lamping of HDPE pipe sections between drainage structures.

D. Contractor shall clean all existing and new storm drainage piping and structures prior to substantial completion. This is to include excavating accumulated sediments and debris in all catch basins, area drains, etc.

END OF SECTION 334100