



Town of Clarkstown

10 Maple Avenue, New City, NY 10956

Project Manual

Volume 1 of 1

Town of Clarkstown Highway Garage

Highway Garage Expansion Project

**Contracts: 1G – General, 1E – Electrical, 1H – HVAC,
and 1P – Plumbing/Fire Protection**

July 26, 2024

Prepared By:

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TOWN OF CLARKSTOWN
NEW CITY, NY
TOWN OF CLARKSTOWN – HIGHWAY GARAGE EXPANSION PROJECT
CONTRACT 1G – GENERAL, 1E – ELECTRICAL, 1H – HVAC, AND 1P – PLUMBING/FIRE
PROTECTION

ENGINEER: Arcadis of New York, Inc. 201 Fuller Road, Suite 201, Albany, NY 12203

Michael Kosier, PE
NY PE #077878



The seal and signature to the left applies to the following Specifications Divisions and Sections of this Project Manual:

- **General Drawings**
- **Civil Drawings**
- **Divisions 00, 01, 02, 31, 32, and 33**

Errol Dawkin, RA
NY RA #023835



The seal and signature to the left applies to the following Specifications Divisions and Sections of this Project Manual:

- **Architectural Drawings**
- **Division 07, 08, 09, 10, and 13**

Cadell Calkins, PE
NY PE #102542



The seal and signature to the left applies to the following Specifications Divisions and Sections of this Project Manual:

- **Structural Drawings**
- **Division 03, 04, 05 and 40**

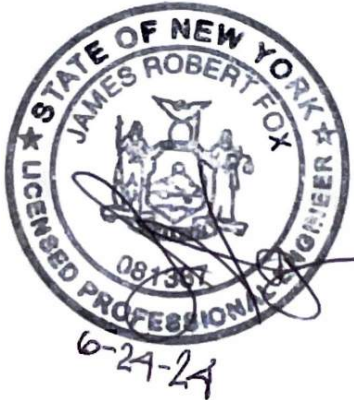
Rajat Bhagat, PE
NY PE #107537



The seal and signature to the left applies to the following Specifications Divisions and Sections of this Project Manual:

- **Plumbing Drawings**
- **HVAC Drawings**
- **Divisions 22 and 23**

James Fox, PE
NY PE #081387



The seal and signature to the left applies to the following Specifications Divisions and Sections of this Project Manual:

- **Fire Protection Drawings**
- **Division 21**

Scott Walowsky< PE
NY PE #107276



The seal and signature to the left applies to the following Specifications Divisions and Sections of this Project Manual:

- **Electrical Drawings**
- **Division 26 – Not Applicable – See Specification Notes on Electrical Drawings**

Engineer's seal and signature does not apply to the documents that comprise Division 00, Bidding and Contracting Requirements.

It is a violation of applicable laws and regulations governing professional licensing and registration for any person, unless acting under the direction of the licensed and registered design professional(s) indicated above, to alter in any way the Specifications in this Project Manual.

Town of Clarkstown Highway Garage Expansion

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ADVERTISEMENT
TOWN OF CLARKSTOWN
10 MAPLE AVENUE, NEW CITY, NY 10956
HIGHWAY GARAGE EXPANSION PROJECT

General Notice

TOWN OF CLARKSTOWN (Owner) is requesting Bids for the construction of the following Project:

HIGHWAY GARAGE EXPANSION PROJECT

Bids for the construction of the Project will be received at the **Town of Clarkstown, Department of Engineering and Facilities Management** located at **10 Maple Avenue, New City, NY 10956**, until **September 4, 2024 at 11 AM** local time. At that time the Bids received will be **publicly** opened and read.

The Project includes the following Work:

Construction of a Highway Garage Expansion.

Separate Bids will be received for the following Contracts:

Contract No.	Description of Contract
1G	General Construction
1E	Electrical Construction
1P	Plumbing and Fire Protection Construction
1H	HVAC Construction

Bid Security

Bid security shall be furnished in accordance with the Instructions to Bidders.

Obtaining the Bidding Documents

Bidding Documents for the Project can be requested found at the following:

e-mail: production@constructivecopy.com

Fee: \$20 for link to electronic documents

Bidding Documents may be downloaded from the designated website. Prospective Bidders are urged to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

Pre-bid Conference

A pre-bid conference for the Project will be held on **August 14, 2024** at **10 AM** at **Town of Clarkstown Highway Garage 12 Seeger Dr, Nanuet, NY 10954**.

Statutory Requirements

Laws, regulations and outside funding requirements, if any, will be referenced in the Instructions to Bidders (ITB) and the text of each will be attached to Section 00 73 73 which will be a Contract Document.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

This Advertisement is issued by:

Owner: **Town of Clarkstown**

By: **Michael Gianatasio, P.E.**

Title: **Director, Department of Engineering and Facilities Management**

Date: **July 31, 2024**

INSTRUCTIONS TO BIDDERS

TOWN OF CLARKSTOWN
10 MAPLE AVENUE, NEW CITY, NY 10956
HIGHWAY GARAGE EXPANSION PROJECT
ALL CONTRACTS

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ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.
- C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.
 - 1. Electronic Documents that are available in native file format include:
 - a. Town of Clarkstown Highway Garage Expansion - Contract Drawings
 - b. Town of Clarkstown Highway Garage Expansion - Project Manual
 - 2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.
 - 3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.
 - 4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder must submit the following information: (Complete the Qualifications Statement included in the Bidding Documents.)
 - A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 Prospective Bidders must submit required information regarding their qualifications as part of the Bid. Owner will review the submitted information to determine which contractors are qualified

to bid on the Work. Owner will issue an Addendum listing those contractors that Owner has determined to be qualified to construct the project. Bids will only be accepted from listed contractors. The information that each prospective Bidder must submit to seek prequalification includes the following: (Complete the Qualifications Statement included in the Bidding Documents.)

- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Prospective Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.03 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work: (Complete the Qualifications Statement included in the Bidding Documents.)
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.04 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.05 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions

at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER’S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
4. *Geotechnical Baseline Report/Geotechnical Data Report:* The Bidding Documents contain a Geotechnical Baseline Report (GBR) and Geotechnical Data Report (GDR).
 - a. As set forth in the Supplementary Conditions, the GBR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations (“Baseline Conditions”). The GBR is a Contract Document.

- b. The Baseline Conditions in the GBR are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on the Baseline Conditions. Bids should be based on a comprehensive approach that includes an independent review and analysis of the GBR, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are baselined.
 - c. Nothing in the GBR is intended to relieve Bidders of the responsibility to make their own determinations regarding construction costs, bidding strategies, and Bid prices, nor of the responsibility to select and be responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.
 - d. As set forth in the Supplementary Conditions, the GDR is a Contract Document containing data prepared by or for the Owner in support of the GBR.
- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

- A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:
 - 1. Geotechnical Data.

Owner will make copies of these other Site-related documents available to any Bidder on request.
- B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.
- C. The other Site-related documents are not part of the Contract Documents.
- D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.
- E. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is scheduled for July 10, 2024 at 10 AM EST at the Town of Clarkstown Highway Garage, 12 Seeger Dr, Nanuet, NY 10954.

- C. Bidders visiting the Site are required to arrange their own transportation to the Site.
- D. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: Robert Milone (r.milone@clarkstown.gov). Bidder must conduct the required Site visit during normal working hours.
- E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- F. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- G. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- H. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
- A. Submit Questions to:
- production@constructivecopy.com
- Michael Gianatasio (m.gianatasio@clarkstown.gov) and
- Robert Milone (r.milone@clarkstown.gov)
- B. Deadline for the submission of questions will be August 26, 2024 at 5 PM EST.
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 100% percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the

Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 Bidder must set forth in the Bid the time by which Bidder must achieve Substantial Completion, subject to the restrictions established in Paragraph 13.07 of these Instructions. The Owner will take Bidder's time commitment regarding Substantial Completion into consideration during the evaluation of Bids, and it will be necessary for the apparent Successful Bidder to satisfy Owner that it will be able to achieve Substantial Completion within the time such Bidder has designated in the Bid. Bidder must also set forth in the Bid its commitments regarding the achievement of Milestones and readiness for final payment. The Successful Bidder's time commitments will be entered into the Agreement or incorporated in the Agreement by reference to the specific terms of the Bid.
- 9.03 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.02 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer within 10 days of the issuance of the Advertisement for Bids or invitation to Bidders. Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner.
- 10.03 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as

supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed within five days after Bid opening.
- 11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
 - A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

- A. Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.

13.02 *Allowances*

- A. For Contingency Allowances, the Bid Price must include the amount established by the Owner on the Bid Form

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid

security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a

material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned.

ARTICLE 16—OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.
- 16.02 Bids will be opened publicly and read aloud.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
 - A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. Bid prices will be compared after adjusting for differences in time of Substantial Completion (total number of calendar days to substantially complete the Work) designated by Bidders. The adjusting amount will be determined at the rate set forth in the Agreement for liquidated damages for failing to achieve Substantial Completion, or such other amount that Owner has designated in the Bid Form.
 - 1. The method for calculating the lowest bid for comparison will be the summation of the Bid price shown in the Bid Form plus the product of the Bidder-specified time of Substantial Completion in calendar days times the rate for liquidated damages in dollars per day.

2. This procedure is only used to determine the lowest bid for comparison and contractor selection purposes. The Contract Price for compensation and payment purposes remains the Bid price shown in the Bid Form.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
 - 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful

Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—STATUTORY AND FUNDING-FINANCING REQUIREMENTS

- 21.01 Document 00 73 73, Statutory and Funding-Financing Agency Requirements, includes statutory requirements or the requirements of funding or financing entities, such as state revolving loan fund programs.
- 21.02 The Bid Form contains statutory requirements or the requirements of funding or financing entities, such as state revolving loan fund programs that must be submitted with the Bid.

ARTICLE 22—SALES AND USE TAXES

- 22.01 Owner is exempt from New York state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

ARTICLE 23—CONTRACTS TO BE ASSIGNED

- 23.01 None. The PEMB system supplier and erector will be a separate contract between the Owner and the PEMB system supplier.

**TOWN OF CLARKSTOWN
CLARKSTOWN, NEW YORK
HIGHWAY GARAGE EXPANSION
CONTRACT 1G - GENERAL**

BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

This Bid is submitted to:

Owner: **Town of Clarkstown**

By: **Michael Gianatasio, P.E.**

Title: **Director, Department of Engineering and Facilities Management**

- 1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. List of Proposed Suppliers;
- D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
- E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
- F. Affidavit of Non-Collusion;
- G. Required Bidder Qualification Statement with supporting data; and
- H. Statutory and Funding Requirements.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

1. Lump Sum Price (Single Lump Sum)

Item No. 1	Lump Sum Bid Price	\$
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- B. All specified contingency allowance(s) are included in the price(s) set forth below.

Item No. 1	Contingency Allowance - General	\$ 75,000.00
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Total of all Lump Sums	\$
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ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder agrees that the Work will be substantially complete on or before _____ **[Bidder to insert date]**, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before _____ **[Bidder to insert date]**.
- 4.03 Bidder agrees that the Work will be substantially complete within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run.
- 4.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda: **[Bidder is to complete table.]**

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies

between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable)

**TOWN OF CLARKSTOWN
CLARKSTOWN, NEW YORK
HIGHWAY GARAGE EXPANSION
CONTRACT 1E - ELECTRICAL**

BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

This Bid is submitted to:

Owner: **Town of Clarkstown**

By: **Michael Gianatasio, P.E.**

Title: **Director, Department of Engineering and Facilities Management**

- 1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - F. Affidavit of Non-Collusion;
 - G. Required Bidder Qualification Statement with supporting data; and
 - H. Statutory and Funding Requirements.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

1. Lump Sum Price (Single Lump Sum)

Item No. 1	Lump Sum Bid Price	\$
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- B. All specified contingency allowance(s) are included in the price(s) set forth below.

Item No. 1	Contingency Allowance – Electrical	\$ 10,000.00
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Total of all Lump Sums	\$
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ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder agrees that the Work will be substantially complete on or before _____ **[Bidder to insert date]**, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before _____ **[Bidder to insert date]**.
- 4.03 Bidder agrees that the Work will be substantially complete within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run.
- 4.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda: **[Bidder is to complete table.]**

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies

between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable)

**TOWN OF CLARKSTOWN
CLARKSTOWN, NEW YORK
HIGHWAY GARAGE EXPANSION
CONTRACT 1P – PLUMBING AND FIRE PROTECTION**

BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

This Bid is submitted to:

Owner: **Town of Clarkstown**

By: **Michael Gianatasio, P.E.**

Title: **Director, Department of Engineering and Facilities Management**

- 1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. List of Proposed Suppliers;
- D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
- E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
- F. Affidavit of Non-Collusion;
- G. Required Bidder Qualification Statement with supporting data; and
- H. Statutory and Funding Requirements.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

1. Lump Sum Price (Single Lump Sum)

Item No. 1	Lump Sum Bid Price	\$
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- B. All specified contingency allowance(s) are included in the price(s) set forth below.

Item No. 1	Contingency Allowance – Plumbing and Fire Protection	\$ 25,000.00
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Total of all Lump Sums	\$
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ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder agrees that the Work will be substantially complete on or before _____ **[Bidder to insert date]**, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before _____ **[Bidder to insert date]**.
- 4.03 Bidder agrees that the Work will be substantially complete within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run.
- 4.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda: **[Bidder is to complete table.]**

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies

between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable)

**TOWN OF CLARKSTOWN
CLARKSTOWN, NEW YORK
HIGWAY GARAGE EXPANSION
CONTRACT 1H – HVAC**

BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

This Bid is submitted to:

Owner: **Town of Clarkstown**

By: **Michael Gianatasio, P.E.**

Title: **Director, Department of Engineering and Facilities Management**

- 1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - F. Affidavit of Non-Collusion;
 - G. Required Bidder Qualification Statement with supporting data; and
 - H. Statutory and Funding Requirements.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

1. Lump Sum Price (Single Lump Sum)

Item No. 1	Lump Sum Bid Price	\$
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- B. All specified contingency allowance(s) are included in the price(s) set forth below.

Item No. 1	Lump Sum Contingency Allowance - HVAC	\$ 5,000.00
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Total of all Lump Sums	\$
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ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder agrees that the Work will be substantially complete on or before _____ **[Bidder to insert date]**, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before _____ **[Bidder to insert date]**.
- 4.03 Bidder agrees that the Work will be substantially complete within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within _____ **[Bidder to insert number of days]** calendar days after the date when the Contract Times commence to run.
- 4.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda: **[Bidder is to complete table.]**

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 Bidder’s Representations

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2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
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6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies

between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable)

BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i> : [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Bid Project <i>(name and location)</i> : [Owner project/contract name, and location of the project] Bid Due Date: [Enter date bid is due]
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
<i>(Full formal name of Bidder)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	<input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation		
<input type="checkbox"/> Limited Liability Company <input type="checkbox"/> Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Pending	

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	

Address:			
Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:		
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$	
Name:		Title:		

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
<input type="checkbox"/> Disadvantaged Business Enterprise		
<input type="checkbox"/> Minority Business Enterprise		
<input type="checkbox"/> Woman-Owned Business Enterprise		
<input type="checkbox"/> Small Business Enterprise		
<input type="checkbox"/> Disabled Business Enterprise		
<input type="checkbox"/> Veteran-Owned Business Enterprise		
<input type="checkbox"/> Service-Disabled Veteran-Owned Business		

<input type="checkbox"/> HUBZone Business (Historically Underutilized) Business		
<input type="checkbox"/> Other		
<input type="checkbox"/> None		

ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:		
Business address:		
Date of Business's most recent financial statement:		<input type="checkbox"/> Attached
Date of Business's most recent audited financial statement:		<input type="checkbox"/> Attached
Financial indicators from the most recent financial statement		
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)		

Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)	
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ARTICLE 6—SURETY INFORMATION

- 6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

- 7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):		
Insurance Provider	Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Does provider have an A.M. Best Rating of A-VII or better?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Mailing Address (principal place of business):		
Physical Address (principal place of business):		

Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:		
As a general contractor:		As a joint venturer:
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:		
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been barred from contracting by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been released from a bid in the past 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Defaulted on a project or failed to complete any contract awarded to it? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Refused to construct or refused to provide materials defined in the contract documents or in a change order? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been a party to any currently pending litigation or arbitration? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Provide full details in a separate attachment if the response to any of these questions is Yes.		

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.

- B. Diverse Business Certifications if required by Paragraph 3.01.
- C. Certification of Business's safety performance if required by Paragraph 4.02.
- D. Financial statements as required by Paragraph 5.01.
- E. Attachments providing additional information as required by Paragraph 8.02.
- F. Schedule A (Current Projects) as required by Paragraph 8.03.
- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
- I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(date signed)

(If Business is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Address for giving notices:

Designated Representative:

Name:

(typed or printed)

Title:

(typed or printed)

Address:

Phone:

Email:

Schedule A—Current Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

NON-COLLUSION AFFIDAVIT

(Completion of this affidavit is required;
the completed affidavit is to be submitted with the Bid.)

SUBMITTED TO:

Town of Clarkstown

SUBMITTED FOR:

Town of Clarkstown
Highway Garage Expansion Project

SUBMITTED BY:

Name of Organization: _____
(Print or Type Name of Bidder)

Name of Individual: _____

Title: _____

Business Address: _____

STATE OF NEW YORK)
) S.S. _____
COUNTY OF _____)

I, _____, of the City of _____, in the County of _____ and the Commonwealth/State of _____ of full age, being duly sworn according to law on my oath depose and say that:

I am _____ of _____, the Bidder submitting the Bid for the Project, and that I executed the said Bid to Owner with full authority to do so; that the Bidder has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with the Project; and that all statements contained in said Bid and in this affidavit are true and correct, and made with full knowledge that the Owner, relative to awarding the Contract, relies upon the truth of the statements contained in the Bid and in the statements and representations in this affidavit.

I further warrant that no person or selling agency has been employed or retained to solicit or secure the Contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by Bidder for the purpose of securing business.

I have not been convicted or found liable for any act prohibited by Laws or Regulations in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract within the last three years.

A conviction or finding of liability for any act prohibited by Laws or Regulations in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract within the last three years may, at Owner's discretion, be grounds for the Owner to decline awarding the Contract to Bidder on the basis of lack of responsibility.

For breach or violation of this warranty the Owner shall have the right to annul the Contract without liability or in its discretion to deduct from the Contract Price or consideration the full amount of such commission, percentage, brokerage or contingent fee.

BIDDER

Company Name: _____

Signature

Typed Name: _____

SWORN TO AND SUBSCRIBED BEFORE ME

THIS ____ DAY OF _____, 20__.

Notary Public

+ + END OF NON-COLLUSION AFFIDAVIT + +

AGREEMENT BETWEEN OWNER AND CONTRACTOR

FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between Town of Clarkstown ("Owner") and [name of contracting entity] ("Contractor").

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: Construction of a Highway Garage Expansion Project.

ARTICLE 2—THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Construction of a Highway Garage Expansion Project.

ARTICLE 3—THE PROJECT

- 3.01 The Owner has retained Arcadis of New York, Inc. ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.
- 3.02 The part of the Project that pertains to the Work has been designed by Arcadis of New York, Inc.

ARTICLE 4—CONTRACT TIMES

- 4.01 *Time is of the Essence*
- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 *Contract Times: Dates*
- A. The Work will be substantially complete on or before November 14, 2025, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before November 28, 2025.
- 4.03 *Milestones*
- A. Parts of the Work must be substantially completed on or before the following Milestone(s):
1. Milestone 1 – Completion of the East Side Retaining Wall and Roadway completed by 12/31/2024.
 2. Milestone 2 – Start of Pavilion Demolition started on or after 3/17/2025.

3. Milestone 3 - Garage Addition and Lean-to Foundation completed by 5/30/2025.
4. Milestone 4 – Garage Addition and Lean-to Erection by Others completed by 8/1/2025.

4.04 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
 1. *Substantial Completion:* Contractor shall pay Owner \$1000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500 for each day that expires after such time until the Work is completed and ready for final payment.
 3. *Milestones:* Contractor shall pay Owner \$1000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.
 4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.05 *Special Damages*

- A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

- C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 30th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. 90 percent of the value of the Work completed (with the balance being retainage).
 - b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

- A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

- A. All amounts not paid when due will bear interest at the rate of 2 percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
1. This Agreement.
 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 3. General Conditions.
 4. Supplementary Conditions.
 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
 6. Drawings (not attached but incorporated by reference) consisting of _____ sheets with each sheet bearing the following general title: Town of Clarkstown Highway Garage Expansion Project.
 7. Drawings listed on the attached sheet index.
 8. Addenda (numbers _____ to _____, inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. 00 73 46, Wage Determination Schedule
 - b. 00 73 73, Statutory and Funding Requirements
 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
 7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
 9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

1. CLARKSTOWN HIGHWAY GARAGE EXPANSION

Owner:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Mailing address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Contract Description <i>(name and location)</i> : [Owner's project/contract name, and location of the project] Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <div style="text-align: center;"><i>(Signature)</i></div>	By: _____ <div style="text-align: center;"><i>(Signature)(Attach Power of Attorney)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>	Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

00 61 13, Performance Bond

EJCDC® C-610, Performance Bond.

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and American Society of Civil Engineers. All rights reserved.

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 Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may 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 Paragraph 3.1 will 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 does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. 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 Paragraph 3.1 does 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 Paragraph 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 Owners 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 Paragraph 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:

- 5.4.1 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
 - 5.4.2 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 Paragraph 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 Paragraph 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 Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will 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:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. 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 Paragraph 5; and
 - 7.3. 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 Paragraph 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 will not be reduced or set off on account of any such unrelated obligations. No right of action will 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 must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must 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 periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
- 12. Notice to the Surety, the Owner, or the Contractor must 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 will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will 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 for the Contractor for 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 will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Mailing address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Contract Description <i>(name and location)</i> : [Owner's project/contract name, and location of the project] Contract Price: [Amount, from Contract] Effective Date of Contract: [Date, from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <div style="text-align: center;"><i>(Signature)</i></div>	By: _____ <div style="text-align: center;"><i>(Signature)(Attach Power of Attorney)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>	Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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 will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 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 Paragraph 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 will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. 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
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 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 Paragraph 13).
6. If a notice of non-payment required by Paragraph 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 Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 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 Paragraph 7.1 or 7.2 will 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 Paragraph 7.1 or 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 will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will 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 will 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 satisfying 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 will 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 Paragraph 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 will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will 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 will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests 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:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

- 16.1.3. 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;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;
 - 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. 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 is to include without limitation in the terms of "labor, materials, or equipment" that part of the 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 will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: None.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
- 11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 - 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 - 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 - 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 - 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 - 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 - 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 - 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 - 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 - 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 - 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

- B. *Change Proposal Procedures*

- 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
- 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

- 3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
- 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
 - 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
 - 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
 - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:* Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance:* Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

Article 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.16 Add the following to Paragraph 1.01.A.16:

Whenever the Project is to be constructed under multiple direct Contracts, the term "Contractor" shall mean the appropriate prime Contractor. Whenever a specific prime Contractor is referred to, terms such as "General Contractor", "Electrical Contractor", "Plumbing Contractor", "HVAC Contractor", or other appropriate Contract-indicating term will be used. The terms "Contractor" and "CONTRACTOR" have the same meaning.

SC-1.01.A.22 Add the following to Paragraph 1.01.A.22:

The terms "Engineer" and "ENGINEER" have the same meaning.

SC-1.01.A.30 Add a new sentence to Paragraph 1.01.A.30 that is to read as follows:

The terms "Owner" and "OWNER" have the same meaning.

SC-1.01.A.40 Add a new sentence to Paragraph 1.01.A.40 that is to read as follows:

Trucking, shipping, and delivery firms, consultants, and entities performing testing or inspection retained by Contractor or any Subcontractor are considered to be Subcontractors.

SC-1.01.A.45 Add a new sentence to Paragraph 1.01.A.45 that is to read as follows:

Entities that rent construction equipment or machinery, but are not incorporated into the Work, are considered to be Suppliers. If such rental entity furnishes both equipment and one or more personnel to operate and maintain the equipment, such entity is a Subcontractor.

Article 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out

(redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- C. *Evidence of Owner's Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor the Contract Documents (including one fully signed counterpart of the Agreement), as one copy in electronic portable document format (PDF).

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- A. Owner shall furnish to Contractor the conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one in electronic portable document format (PDF).

2.06 *Electronic Transmittals*

SC-2.06 Delete Paragraph 2.06.B in its entirety and insert the following in its place:

- B. Electronic Means are established in Specification Section 01 31 26, Electronic Document Protocol.

Article 3—**CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE**

3.01 *Intent*

SC-3.01 Delete Paragraph 3.01.C in its entirety.

Article 4—**COMMENCEMENT AND PROGRESS OF THE WORK**

4.01 *Commencement of Contract Times; Notice to Proceed – No Change*

4.05 *Delays in Contractor's Progress – No Change*

Article 5—**SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS**

5.01 *Availability of Lands – No Change*

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Geotechnical Report	April 19, 2023	Site Geotechnical Data

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None		

- G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents at Town Of Clarkstown Highway Garage during regular business hours, or may request copies from Engineer.

5.06 Hazardous Environmental Conditions

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
None		

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None		

Article 6— BONDS AND INSURANCE

6.01 Performance, Payment, and Other Bonds

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

- Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
- Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

6.02 Insurance—General Provisions

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

1. Contractor may obtain worker's compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the Project is located, (b) is certified or authorized as a worker's compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker's compensation insurance for similar projects by the state within the last 12 months.

6.03 Contractor's Insurance

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: None.
- E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	\$500,000
Bodily injury by disease—aggregate	\$500,000
Employer's Liability	
Each accident	\$500,000
Each employee	\$500,000
Policy limit	\$500,000
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$1,000,000

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).

6. Any limitation or exclusion based on the nature of Contractor's work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$1,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

- J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$2,000,000

- K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$5,000,000
General Aggregate	\$5,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of \$[specify amount] after accounting for partial attribution of its limits to underlying policies, as allowed above.

- M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$0
General Aggregate	\$0

- N. *Contractor's Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	\$1,000,000
Annual Aggregate	\$1,000,000

- O. *Railroad Protective Liability Insurance:* Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Contractor shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and (4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.

[Insert additional specific requirements, commonly set by the railroad, here.]

Railroad Protective Liability Insurance	Policy limits of not less than:
Each Claim	\$0
Aggregate	\$0

- P. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly *referred* to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	\$0
General Aggregate	\$0

Q. *Other Required Insurance:* None.

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Delete Paragraph 6.04.A and insert the following in its place:

- A. Owner shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).
 - a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.
 - b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.
2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).
4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of 100 percent of the property value.
5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of 100 percent of the property value.
6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.
8. include performance/hot testing and start-up, if applicable.
9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
10. include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:
 - a. None.
11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:
 - a. Pre-Engineered Building Systems.
12. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of 100 percent of value.
13. In addition to the coverage sublimits stated above, the following coverages are also subject to sublimits, as follows:
 - a. None.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provision:

- G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

- H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.
 - 1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than \$1,000,000 for direct physical loss in any one occurrence.

Article 7—CONTRACTOR'S RESPONSIBILITIES

7.02 *Supervision and Superintendence*

SC-7.02 Amend Paragraph 7.02.B of the General Conditions by adding the following sentence:
Unless the Owner otherwise agrees in writing, the superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

7.03 *Labor; Working Hours*

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

- 1. Regular working hours will be 7:00 AM to 5 PM
- 2. Owner's legal holidays are current United States Federal Holidays.

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state "...all Work at the Site must be performed during regular working hours, Monday through Friday with Saturday as an optional work day. Contractor will not perform Work on a Sunday, or any legal holiday."

SC-7.03 Add the following new paragraph immediately after Paragraph 7.03.C:

- D. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-7.03 Add the following new subparagraph immediately after Paragraph SC-7.03.D:

- 1. For purposes of administering the foregoing requirement, additional overtime costs are defined as hours in excess of 8 hours per day or 40 hours within the work week.

7.10 *Taxes*

SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:

- A. Owner is exempt from payment of sales and compensating use taxes of the State of New York and of cities and counties thereof on all materials to be incorporated into the Work.
 - 1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

7.13 *Safety and Protection*

SC-7.13 Amend the second sentence of Paragraph 7.13.G by deleting the words "...the Supplementary Conditions or Specifications." and replace with the words Specification Section 01 35 23, Safety Requirements".:

7.14 *Hazard Communication Programs*

SC-7.14 Delete Paragraph 7.14.A in its entirety and insert the following in its place:

A. General Contractor shall be responsible for coordinating exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with all Laws and Regulations. General Contractor shall provide a centralized location for the maintenance of the safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the safety data sheets or other hazard communication information shall be readily accessible to the employees of all employers on the Site. Each other Contractor or employer shall furnish to the General Contractor safety data sheets and other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with all Laws and Regulations.

Article 8—OTHER WORK AT THE SITE

8.02 *Coordination*

SC-8.02 Add the following new Paragraph 8.02.C immediately after Paragraph 8.02.B and renumber the following paragraphs:

- C. Owner intends to contract with others for the performance of other work at or adjacent to the Site, as indicated in Specification Section 01 12 13, Summary of Work.
 1. General CONTRACTOR shall have authority and responsibility for coordination of the various contractors and work forces at the Site;
 2. The following specific matters are to be covered by such authority and responsibility: Coordination with PEMB system manufacturer and erector;
 3. The extent of such authority and responsibilities is: Coordination of PEMB system materials delivery, receipt and offloading of the PEMB system by the General Contractor and coordination of PEMB system erection on the General Contractor supplied foundation.

Article 9—OWNER’S RESPONSIBILITIES

9.13 *Owner’s Site Representative*

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

9.13 *Owner’s Site Representative*

- A. Owner will furnish an “Owner’s Site Representative” to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner’s Site Representative is not Engineer’s consultant, agent, or employee. Owner’s Site Representative will be Arcadis of New York, Inc. The authority and responsibilities of Owner’s Site Representative follow:
Coordination of site access and existing site operations.

Article 10—ENGINEER’S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
 - 1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor’s safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 - 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR’s own personal safety while at the Site.
 - 3. *Liaison*
 - a. Serve as Engineer’s liaison with Contractor. Working principally through Contractor’s authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner’s liaison with Contractor when Contractor’s operations affect Owner’s on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor’s proper execution of the Work.
 - 4. *Review of Work; Defective Work*
 - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.

- c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
- 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
 - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
- 6. *Payment Requests:* Review Applications for Payment with Contractor.
- 7. *Completion*
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 - 7. Authorize Owner to occupy the Project in whole or in part.

Article 11—CHANGES TO THE CONTRACT

No suggested Supplementary Conditions in this Article.

Article 12—CLAIMS

Article 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01 Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of Rental Rate Blue Book for Construction Equipment.

SC-13.01 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

- a. For purposes of this paragraph, “small tools and hand tools” means any tool or equipment whose current price if it were purchased new at retail would be less than \$500.

Article 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

No suggested Supplementary Conditions in this Article.

Article 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.01 *Progress Payments*

SC-15.01 Add the following new Paragraph 15.01.F:

- F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.

15.03 *Substantial Completion*

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.08 *Correction Period*

Article 16—**SUSPENSION OF WORK AND TERMINATION**

No suggested Supplementary Conditions in this Article.

Article 17—**FINAL RESOLUTIONS OF DISPUTES**

No suggested Supplementary Conditions in this Article.

Article 18—**MISCELLANEOUS**

No suggested Supplementary Conditions in this Article.

18.08 *Assignment of Contract*

WAGE DETERMINATION SCHEDULE

New York State Department of Labor

Prevailing Wages – Project Rates



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Town of Clarkstown
Todd Minehardt
2424 Harrodsburg Road
Lexington NY 41003

Schedule Year 2023 through 2024
Date Requested 04/17/2024
PRC# 2024004532

Location Town Highway Garage Facility
Project ID#
Project Type Addition to existing garage, new vehicle covered parking, site improvements, and existing garage modifications.

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 2023 through June 2024. 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 12226

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.

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 from 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 12226; 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, contemporaneous, 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 12226 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.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Town of Clarkstown
Todd Minehardt
2424 Harrodsburg Road
Lexington NY 41003

Schedule Year 2023 through 2024
Date Requested 04/17/2024
PRC# 2024004532

Location Town Highway Garage Facility
Project ID#
Project Type Addition to existing garage, new vehicle covered parking, site improvements, and existing garage modifications.

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: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	<input type="checkbox"/> (01) General Construction	
Approximate Completion Date: ____/____/____	<input type="checkbox"/> (02) Heating/Ventilation	
	<input type="checkbox"/> (03) Electrical	
	<input type="checkbox"/> (04) Plumbing	
	<input type="checkbox"/> (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

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.

**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

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 12226

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.

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)



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.

Your pay stub and wage notice received upon hire must clearly state your wage rate and supplement rate.

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/bureau-public-work>



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) 568-5287		

* 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 or 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 requirements 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 than 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 12226

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

04/01/2024

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:	07/01/2023	01/01/2024
Boilermaker	\$ 65.88	\$ 67.38
Repairs & Renovations	65.88	67.38

Repairs & Renovation: Includes Repairing, Renovating replacement of parts to an existing unit(s).

SUPPLEMENTAL BENEFITS

Per Hour:

Boilermaker	33.5% of hourly	33.5% of Hourly
Repair \$ Renovations	Wage Paid	Wage Paid
	+ \$ 26.49	+ \$26.85

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 (*B, O, **U) on OVERTIME PAGE

Note:* Includes 9th & 10th hours, double for 11th or more.

** Labor Day ONLY, if worked.

Repairs & Renovation see (B,E,Q) on OT Page

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 12, 15, 25, 26, 29) on HOLIDAY PAGE

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)	33.5% of Hourly Wage Paid Plus Amount Below	33.5% of Hourly Wage Paid Plus Amount Below
1st Term	\$ 20.12	\$ 20.36
2nd Term	21.03	21.28
3rd Term	21.95	22.22
4th Term	22.83	23.12
5th Term	23.76	24.07
6th Term	24.67	25.00
7th Term	25.58	25.93

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter

04/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Piledriver \$ 59.16
+ 9.79*

Dockbuilder \$ 59.16
+ 9.79*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 45.34

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
\$25.60	\$31.20	\$39.58	\$47.97
+ 5.30*	+ 5.30*	+ 5.30*	+ 5.30*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All Terms: \$ 31.83

8-1556 Db

Carpenter

04/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

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:

\$ 39.45

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
\$ 25.20	\$ 28.20	\$ 32.45	\$ 40.33

+ 1.85* + 2.35* + 2.85* + 3.85*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 15.22	\$ 16.22	\$ 19.32	\$ 20.32

8-2287

Carpenter**04/01/2024**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Marine Construction:

Marine Diver \$ 74.03
 + 9.79*

Marine Tender \$ 53.57
 + 9.79*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 45.34

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 13, 16, 18, 19, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms.

1st year	\$ 25.60 + 5.30*
2nd year	31.20 + 5.30*
3rd year	39.58 + 5.30*
4th year	47.97 + 5.05*

*This portion is not subject to overtime premiums

Supplemental Benefits

Per Hour:

All terms \$ 31.83

8-1456MC

Carpenter**04/01/2024**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Building
Millwright \$ 58.70
 + 12.62*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Millwright \$ 44.31

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.
\$31.74	\$37.19	\$42.64	\$53.54
+ 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.
\$29.81	\$32.34	\$35.52	\$39.94

8-740.1

Carpenter

04/01/2024

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: 07/01/2023

Core Drilling:

Driller \$ 43.88
 + 2.50*

Driller Helper

\$ 34.47
+ 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 \$ 28.85

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

04/01/2024

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

WAGES

WAGES:(per hour)

Applies to CAPRENTER BUILDING/HEAVY & HIGHWAY/TUNNEL:

	07/01/2023	07/01/2024	07/01/2025	07/01/2026
		Additional	Additional	Additional
Base Wage	\$ 39.80	\$ 1.25**	\$ 1.25**	\$ 1.25**
	+\$6.71*			

*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 \$ 33.22

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
\$ 19.90	\$ 23.88	\$ 25.87	\$ 27.86	\$ 31.84
+3.58*	+3.58*	+3.58*	+3.58*	+3.58*

*For all hours paid straight or premium

SUPPLEMENTAL BENEFITS per hour:

All terms \$ 16.27

11-279.1B/HH

Electrician

04/01/2024

JOB DESCRIPTION Electrician

DISTRICT 11

ENTIRE COUNTIES

Orange, Putnam, Rockland

PARTIAL COUNTIES

Dutchess: Towns of Fishkill, East Fishkill, and Beacon.

WAGES

Per hour:

	07/01/2023	04/01/2024
Electrician Wireman/Technician	\$ 49.50 +9.00*	\$ 50.50 + 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	\$ 58.08 + 9.00*	\$ 59.30 + 9.50*
Between 12:30am & 8:30am	\$ 65.06 + 9.00*	\$66.35 + 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

	07/01/2023	04/01/2024
Per hour:	\$ 28.68 plus	\$ 29.68 plus
Journeyman	3% of straight or premium wage	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

07/01/2023	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 14.25 +1.00*	\$ 19.00 +1.00*	\$ 23.75 +1.50*	\$ 28.50 +2.00*	\$ 33.25 +2.50*	\$ 35.63 +2.50*
2nd Shift	16.72 +1.00*	22.29 +1.00*	27.86 +1.50*	33.43 +2.00*	39.00 +2.50*	41.79 +2.50*
3rd Shift	18.72 +1.00*	24.97 +1.00*	31.21 +1.50*	37.45 +2.00*	43.69 +2.50*	46.82 +2.50*
09/01/2023	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 15.68 +1.00*	\$ 19.00 +1.00*	\$ 23.75 +1.50*	\$ 28.50 +2.00*	\$ 33.25 +2.50*	\$ 35.63 +2.50*
2nd Shift	18.39 +1.00*	22.29 +1.00*	27.86 +1.50*	33.43 +2.00*	39.00 +2.50*	41.79 +2.50*
3rd Shift	20.60 +1.00*	24.97 +1.00*	31.21 +1.50*	47.45 +2.00*	43.69 +2.50*	46.82 +2.50*
04/01/2024	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 16.01 +1.00*	\$ 19.40 +1.00*	\$ 24.25 +1.50*	\$ 29.10 +2.00*	\$ 33.95 +2.50*	\$ 36.38 +2.50*
2nd Shift	18.78 +1.00*	22.76 +1.00*	28.45 +1.50*	34.13 +2.00*	39.82 +2.50*	42.67 +2.50*
3rd Shift	21.04 +1.00*	25.49 +1.00*	31.86 +1.50*	38.24 +2.00*	44.61 +2.50*	47.80 +2.50*
09/01/2024	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 16.01 +1.00*	\$ 19.40 +1.00*	\$ 24.25 +1.00*	\$ 29.10 +2.00*	\$ 33.95 +2.50*	\$ 36.38 +2.50*
2nd Shift	18.78 +1.00*	22.76 +1.00*	28.45 +1.00*	34.13 +2.00*	39.82 +2.50*	42.67 +2.50*

3rd Shift	21.04 +1.00*	25.49 +1.00*	31.86 +1.00*	38.24 +2.00*	44.61 +2.50*	47.80 +2.50*
04/01/2025	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 16.34 +1.00*	\$ 19.80 +1.00*	\$ 24.75 +1.00*	\$ 29.70 +2.00*	\$ 34.65 +2.50*	\$ 37.13 +2.50*
2nd Shift	19.17 +1.00*	23.23 +1.00*	29.03 +1.00*	34.84 +2.00*	40.64 +2.50*	43.55 +2.50*
3rd Shift	21.47 +1.00*	26.02 +1.00*	32.52 +1.00*	39.03 +2.00*	45.53 +2.50*	48.79 +2.50*

*For all hours paid straight or premium, not to be included in 3% calculation for supplemental benefits.

SUPPLEMENTAL BENEFITS per hour:

07/01/2023

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

04/01/2024

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:

07/01/2023

Elevator Constructor \$ 77.49

Modernization &
Service/Repair \$ 60.89

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor \$ 45.574

Modernization &
Service/Repairs 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
2nd & 3rd Term	36.024
4th & 5th Term	36.943
6th & 7th Term	38.448
8th & 9th Term	39.953

Modernization &
Service/Repair

1st Term	\$ 0.00
2nd & 3rd Term	35.694
4th & 5th Term	36.525
6th & 7th Term	37.948
8th & 9th Term	39.38

4-1

Elevator Constructor

04/01/2024

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	07/01/2023	01/01/2024
Mechanic	\$ 67.35	\$ 70.15
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour	07/01/2023	01/01/2024
Journeyman/Helper	\$ 37.335*	\$ 37.885*

(*)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

04/01/2024

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: 7/01/2023

Glazier & Glass Tinting	\$ 61.64
*Scaffolding	65.64
Window Film	
**Repair & Maintenance	30.76

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 30' or more, but not pipe scaffolding.

**Repair & Maintenance- All repair & maintenance work on a particular building whenever performed, where the total cumulative Repair & Maintenance contract value is under \$184,000.

SUPPLEMENTAL BENEFITS

Per hour: 7/01/2023

Glazier & Glass Tinting	\$ 40.20
Window Film	
Repair & Maintenance	23.19

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

For 'Repair & Maintenance' 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'

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:

7/01/2023

1st term	\$ 21.93
2nd term	30.05
3rd term	39.95
4th term	48.97

Supplemental Benefits:

(Per hour)

1st term	\$ 18.25
2nd term	25.97
3rd term	31.27
4th term	34.32

Insulator - Heat & Frost **04/01/2024**

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour:	07/01/2023	06/01/2024
Insulator	\$ 59.25	+ \$ 2.50
Discomfort & Additional Training**	62.31	+ \$ 2.50
Fire Stop Work*	31.77	+ \$ 2.50

* 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	\$ 37.35
Discomfort & Additional Training	39.39
Fire Stop Work: Journeyworker	19.03

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
\$ 31.77	\$ 37.26	\$ 42.76	\$ 48.26

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
\$ 33.30	\$ 39.09	\$ 44.90	\$ 50.71

Supplemental Benefits paid per hour:

Insulator Apprentices:

1st term	\$ 19.03
2nd term	22.69
3rd term	26.36
4th term	30.03

Discomfort & Additional Training Apprentices:

1st term	\$ 20.06
2nd term	23.92
3rd term	27.78
4th term	31.66

Ironworker

04/01/2024

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: 07/01/2023

Reinforcing &
Metal Lathing \$ 56.95

"Base" Wage \$ 55.20
plus \$ 1.75

"Base" Wage is used to calculate overtime hours only.

SUPPLEMENTAL BENEFITS

Per hour:
Reinforcing & Metal Lathing \$ 42.72

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 \$ 49.47
Double Time \$ 56.22

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	\$ 28.38	\$ 34.68	\$ 37.18
"Base" Wage \$ 21.00 plus \$1.55	\$ 26.80 plus \$1.58	\$ 33.10 plus \$1.58	\$ 35.60 plus \$1.58

"Base" Wage is used to calculate overtime hours ONLY.

SUPPLEMENTAL BENIFITS

Per Hour:			
1st term \$ 18.17	2nd term \$ 21.34	3rd term \$ 22.00	4th Term \$ 22.50

4-46Reinf

Ironworker

04/01/2024

JOB DESCRIPTION Ironworker

DISTRICT 11

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster

WAGES

Per hour:	07/01/2023	07/01/2024	07/01/2025	07/01/2026
		Additional	Additional	Additional
Structural	\$ 52.63	\$ 2.00*	\$ 2.00*	\$ 2.00*
Reinforcing*	52.63	2.00*	2.00*	2.00*

Ornamental	52.63	2.00*	2.00*	2.00*
Chain Link Fence	52.63	2.00*	2.00*	2.00*

* 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	\$ 52.63
2nd Shift	67.34
3rd Shift	72.24

**Note- Any shift that works past 12:00 midnight shall receive the 3rd shift differential.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 43.47
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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	\$ 26.32	\$ 31.58	\$ 36.85	\$ 42.10
2nd Shift	36.16	42.40	48.64	54.86
3rd Shift	39.45	46.00	52.57	59.12

Supplemental Benefits per hour:

1st year	\$ 37.35
2nd year	38.57
3rd year	39.80
4th year	41.02

11-417

Laborer - Building

04/01/2024

JOB DESCRIPTION Laborer - Building

DISTRICT 11

ENTIRE COUNTIES

Rockland

WAGES

Class 1: Custodial and janitorial work, general cleanup, and flag person.

Class 2: Concrete laborer, mason tending, hod carrier, signal person, pressure blasting and washing, chainsaw, demo saw, jackhammers, general labor.

Class 3: Jumping jack, air track drills, grading, explosive handler and blaster, grade checker. When OSHA requires negative pressure respirator.

Class 4: Environmental work including but not limited to asbestos abatement, toxic and hazardous abatement, lead abatement work, mold remediation and biohazards.

WAGES: (per hour)	07/01/2023	06/01/2024 Additional	06/01/2025 Additional	06/01/2025 Additional
Class 1	\$ 41.48	\$ 2.51*	\$ 2.60*	\$ 2.69*
Class 2	44.59	2.62*	2.71*	2.81*
Class 3	45.72	2.66*	2.75*	2.85*
Class 4	46.91	2.70*	2.80*	2.89*

*To be allocated at a later date.

SHIFT DIFFERENTIAL: On all Governmental mandated or irregular or off shift work, an additional 25% 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	\$ 29.50
Shift Differential	\$ 36.37

OVERTIME PAY

See (B, *E, E5, **Q) on OVERTIME PAGE

*For first 8 hours on Saturday

**When an employee is required to work on a holiday which falls on a Sunday the employee shall be paid three (3) times the hourly rate and one (1) hour benefits for every hour worked. When an employee is required to work on a holiday which falls on a Saturday the employee shall be paid two and a half (2.5) times the hourly rate and one hour benefits for every hour worked.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

(1000) hour terms at the following wages.

	07/01/2023	06/01/2024
1st term	\$ 27.05	\$ 28.05
2nd term	31.25	32.35
3rd term	35.40	36.70
4th term	39.55	41.00

Supplemental Benefits per hour:

All Terms Regular	\$ 28.50	\$ 29.40
All Terms Shift Rate	35.12	TBD

11-754B

Laborer - Heavy&Highway

04/01/2024

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, 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)	07/01/2023	06/01/2024
		Additional
Class 1	\$ 43.75	\$ 2.25**
Class 2	47.35	2.35**
Class 3	51.65	2.45**
Class 4	55.05	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.

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 29.38
Shift Differential	34.87

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.

	07/01/2023	06/01/2024
1st term	\$ 27.05	\$ 28.05
2nd term	31.25	32.35
3rd term	35.40	36.70
4th term	39.55	41.00

Supplemental Benefits per hour:

All Terms Regular	\$ 28.50	\$ 29.40
All Terms Shift Rate	33.79	TBD

11-754H/H

Laborer - Tunnel

04/01/2024

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)

	07/01/2023	06/01/2024	06/01/2025
Class 1	\$ 55.55	\$ 57.05	\$ 58.55
Class 2	57.70	59.20	60.70
Class 4	64.10	65.60	67.10
Class 5	47.65	49.90	51.40

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	\$ 35.73	\$ 36.98	\$ 38.23
Benefit 2	51.01	TBD	TBD
Benefit 3	71.28	TBD	TBD

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

04/01/2024

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:	07/01/2023	05/06/2024
Group A:		
Lineman, Technician	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	57.40	58.90
Welder, Cable Splicer	57.40	58.90
Group B:		
Digging Mach. Operator	51.66	53.01
Tractor Trailer Driver	48.79	50.07
Groundman, Truck Driver	45.92	47.12
Equipment Mechanic	45.92	47.12
Flagman	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)

Group A:		
Lineman, Technician	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	57.40	58.90
Cable Splicer	63.14	64.79
Certified Welder, Pipe Type Cable	60.27	61.85

Group B:		
Digging Mach. Operator	51.66	53.01
Tractor Trailer Driver	48.79	50.07
Groundman, Truck Driver	45.92	47.12
Equipment Mechanic	45.92	47.12
Flagman	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)

Group A:		
Lineman, Tech, Welder	\$ 58.72	\$ 60.22
Crane, Crawler Backhoe	58.72	60.22
Cable Splicer	64.59	66.24
Certified Welder, Pipe Type Cable	61.66	63.23

Group B:		
Digging Mach. Operator	52.85	54.20
Tractor Trailer Driver	49.91	51.19
Groundman, Truck Driver	46.98	48.18
Equipment Mechanic	46.98	48.18
Flagman	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)

Group A:		
Lineman, Tech, Welder	\$ 59.91	\$ 61.41
Crane, Crawler Backhoe	59.91	61.41
Cable Splicer	59.91	61.41

Group B:		
Digging Mach. Operator	53.92	55.27
Tractor Trailer Driver	50.92	52.20
Groundman, Truck Driver	47.93	49.13
Equipment Mechanic	47.93	49.13
Flagman	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 %

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2023	05/06/2024
Group A	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid
Group B	\$ 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.

OVERTIME PAY

See (B, E, Q, X) 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:

07/01/2023	05/06/2024
\$ 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

04/01/2024

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).

	07/01/2023	01/01/2024	01/01/2025
Cable Splicer	\$ 37.73	\$ 39.24	\$ 40.81
Installer, Repairman	\$ 35.81	\$ 37.24	\$ 38.73
Teledata Lineman	\$ 35.81	\$ 37.24	\$ 38.73
Tech., Equip. Operator	\$ 35.81	\$ 37.24	\$ 38.73
Groundman	\$ 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:	07/01/2023	01/01/2024	01/01/2025
Journeyman	\$ 5.70	\$ 5.70	\$ 5.70
	*plus 3% of the hourly wage paid	*plus 3% of the hourly wage paid	*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	04/01/2024
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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:	07/01/2023	05/06/2024
Group A:		
Lineman, Technician	\$ 50.60	\$ 51.82
Crane, Crawler Backhoe	50.60	51.82
Certified Welder	53.13	54.41
Group B:		
Digging Machine	45.54	46.64
Tractor Trailer Driver	43.01	44.05
Groundman, Truck Driver	40.48	41.46
Equipment Mechanic	40.48	41.46
Flagman	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%

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2023	05/06/2024
Group A:	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid
Group B	\$ 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.

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:

07/01/2023	05/06/2024
\$ 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

04/01/2024

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:	07/01/2023	12/31/2023
Tree Trimmer	\$ 29.80	\$ 31.44
Equipment Operator	26.35	27.80
Equipment Mechanic	26.35	27.80
Truck Driver	21.95	23.15
Groundman	18.07	19.07
Flag person	14.20	14.20*

*NOTE- Rate effective on 01/01/2024 - \$15.00 due to minimum wage increase

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2023	12/31/2023
Journeyman	\$ 10.48	\$ 10.48
	*plus 4.5% of the hourly wage paid	*plus 4.5% of the hourly wage paid

* The 4.5% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q, X) 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

04/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	12/04/2023	06/03/2024
Tile Finisher	\$ 48.36	\$ 48.80	Additional \$ 0.59

SUPPLEMENTAL BENEFITS

Per Hour:		
	\$ 22.56*	\$ 22.71*
	+ \$9.86	+ \$9.86

*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

04/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	12/04/2023	06/05/2024 Additional \$ 0.72
Tile Setters	\$ 62.98	\$ 63.50	

SUPPLEMENTAL BENEFITS

Per Hour:	\$ 25.61*	\$25.81*
	+ \$10.04	+ \$10.04

* 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
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6501-7000
07/01/2023									
\$21.70	\$26.66	\$33.75	\$38.69	\$42.25	\$45.70	\$49.29	\$54.23	\$57.09	\$61.25
12/04/2023									
\$21.96	\$26.95	\$34.10	\$39.08	\$42.68	\$46.16	\$49.79	\$54.77	57.66	\$61.90

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
07/01/2023									
\$12.55*	\$12.55*	\$15.36*	\$15.36*	\$16.36*	\$17.86*	\$18.86*	\$18.86*	\$16.86*	\$22.11*
+\$0.73	+\$0.78	+\$0.88	+\$0.88	+\$1.37	+\$1.42	+\$1.83	+\$1.88	+\$6.03	+\$6.61
12/04/2023									
\$12.55*	\$12.55*	\$15.63*	\$15.36*	\$16.36*	\$17.86*	\$18.86*	\$18.86*	\$16.86*	\$22.11*
+\$0.73	+\$0.78	+\$0.89	+\$0.94	+\$1.38	+\$1.43	+\$1.84	+\$1.89	+\$6.04	+\$6.62

* This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52A

Mason - Building **04/01/2024**

JOB DESCRIPTION Mason - Building

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:	07/01/2023
Bricklayer	\$ 45.89
Cement Mason	45.89
Plasterer/Stone Mason	45.89
Pointer/Caulker	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 workday is mandated or required by state, federal, county, local or other governmental agency contracts, the following premiums apply:

Irregular workday 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 \$ 37.95

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

04/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour:

07/01/2023	7/03/2023
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Marble Cutters & Setters	\$ 62.82	\$ 63.12
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SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker	\$ 39.03	\$ 39.34
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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:

07/01/2023

750 hour terms at the following wage

1st	2nd	3rd	4th	5th	6th	7th	8th
0-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6751-7500	7500+

\$ 26.42	\$ 39.62	\$ 42.91	\$ 46.22	\$ 49.52	\$ 53.38	\$ 59.67	\$ 62.82
Supplemental Benefits per hour:							
07/01/2023							
1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 25.38	\$ 28.86	\$ 29.74	\$ 30.60	\$ 31.48	\$ 36.44	\$ 38.17	\$ 39.03

07/03/2023
Wage Per Hour:

750 hour terms at the following wage.							
1st	2nd	3rd	4th	5th	6th	7th	8th
0-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6751-7500	7500+
\$ 26.60	\$ 39.82	\$ 43.13	\$ 46.45	\$ 49.78	\$ 53.64	\$ 59.95	\$ 63.12

Supplemental Benefits Per Hour:							
1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 25.54	\$ 29.09	\$ 29.97	\$ 30.84	\$ 31.72	\$ 36.73	\$ 38.48	\$ 39.34

9-7/4

Mason - Heavy&Highway	04/01/2024
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JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES
Putnam, Rockland, Westchester

PARTIAL COUNTIES
Orange: Only the Township of Tuxedo.

WAGES

Per hour:

07/01/2023

Bricklayer	\$ 46.39
Cement Mason	46.39
Marble/Stone Mason	46.39
Plasterer	46.39
Pointer/Caulker	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 workday is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:

- Irregular workday 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	\$ 37.95
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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

04/01/2024

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-Trimmed-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, Quarmaster (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, Squeezcrete & 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); Barrier Moving Machine-Zipper; 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 (Hetzl, 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); Pot Hole Killer Trucks or equivalent; 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)

	07/01/2023	07/01/2024 Additional	07/01/2025 Additional
Class A5	\$ 65.72 plus 4.00*	\$ 2.75***	\$ 2.50***
Class A4	64.72 plus 4.00*	2.75***	2.50***
Class A3	63.72 plus 4.00*	2.75***	2.50***
Class A2	61.22 plus 4.00*	2.75***	2.50***
Class A1	60.22 plus 4.00*	2.75***	2.50***
Class A	59.22 plus 4.00*	2.75***	2.50***
Class B	57.63 plus 4.00*	2.75***	2.50***
Class C	55.72 plus 4.00*	2.75***	2.50***
Class D	54.09 plus 4.00*	2.75***	2.50***
Class E	50.38 plus 4.00*	2.75***	2.50***
Safety Engineer	59.96 plus 4.00*	2.75***	2.50***
Helicopter:			
Pilot/Engineer	61.04 plus 4.00*	2.75***	2.50***
Co Pilot	59.22 plus 4.00*	2.75***	2.50***
Communications Engineer	59.22 plus 4.00*	2.75***	2.50***
Surveying:			
Chief of Party	59.22 plus 4.00*	2.75***	2.50***
Transit/Instrument Man	50.38 plus 4.00*	2.75***	2.50***
Rod/Chainman	49.80 plus 4.00*	2.75***	2.50***
Additional \$0.75 for Survey work Tunnel under compressed air.			
Additional \$0.50 for Hydrographic work.			

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 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.

***To be allocated at a later date

- 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 \$4.00*
2nd year	70% of Class base wage plus \$4.00*
3rd year	80% of Class base wage plus \$4.00*
4th year	90% of Class base wage plus \$4.00*

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 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

04/01/2024

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:	07/01/2023	10/01/2023
CLASS A1	\$ 43.94	\$ 45.26
Deck Captain, Leverman		
Mechanical Dredge Operator		
Licensed Tug Operator 1000HP or more.		

CLASS A2 Crane Operator (360 swing)	39.16	40.33
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	38.00	39.14
CLASS B2 Certified Welder	35.77	36.84
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	34.79	35.83
CLASS C2 Boat Operator	33.67	34.68
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	27.97	28.81

SUPPLEMENTAL BENEFITS

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	\$ 11.85 plus 6% of straight time wage, Overtime hours add \$ 0.63	\$ 12.00 plus 6% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50	\$ 11.75 plus 6% of straight time wage, Overtime hours add \$ 0.50
All Class D	\$ 11.35 plus 6% of straight time wage, Overtime hours add \$ 0.38	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50

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

04/01/2024

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)

	07/01/2023	07/01/2024 Additional	07/01/2025 Additional
Class A3	\$ 67.74 plus 4.00*	\$ 2.75**	\$ 2.50**
Class A2	66.08 plus 4.00*	2.75**	2.50**
Class A1	63.24 plus 4.00*	2.75**	2.50**
Class A	61.58 plus 4.00*	2.75**	2.50**
Class B	58.79 plus 4.00*	2.75**	2.50**
Class C	56.13 plus 4.00*	2.75**	2.50**
Class D	54.60 plus 4.00*	2.75**	2.50**
Class E	50.84 plus 4.00*	2.75**	2.50**
Vacuum Truck	59.55 plus 4.00*	2.75**	2.50**
Safety Engineer	60.41 plus 4.00*	2.75**	2.50**
Helicopter:			
Pilot/Engineer	63.24 plus 4.00*	2.75**	2.50**
Co Pilot	62.85 plus 4.00*	2.75**	2.50**
Communications Engineer	62.85 plus 4.00*	2.75**	2.50**
Surveying:			
Chief of Party	59.55 plus 4.00*	2.75**	2.50**
Transit/Instrument man	50.84 plus 4.00*	2.75**	2.50**
Rod/Chainman	49.80 plus 4.00*	2.75**	2.50**
Additional \$0.75 for Survey work Tunnels under compressed air.			
Additional \$0.50 for Hydrographic work.			

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

**To be allocated at a later date

- 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 \$4.00*
2nd year	70% of Class base wage plus \$4.00*
3rd year	80% of Class base wage plus \$4.00*
4th year	90% of Class base wage plus \$4.00*

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

Supplemental Benefits per hour:

Apprentices \$ 33.50

11-825SE

Painter	04/01/2024
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JOB DESCRIPTION Painter **DISTRICT 1**

ENTIRE COUNTIES
Rockland

WAGES		
Wages per hour	07/01/2023	07/01/2024 Additional
Brush/Paper Hanger	\$ 41.17	+ \$1.93*
Dry Wall finisher	41.17	+ \$1.93*
Sandblaster-Painter	41.17	+ \$1.93*
Lead Abatement	41.17	+ \$1.93*
Spray Rate	42.17	+ \$1.93*

(*) To be allocated at later date.

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 \$ 26.28

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

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
50%	55%	65%	75%	85%	95%

Supplemental Benefits per hour worked

1st term	\$ 11.14
All others	26.28

1-155ROC

Painter - Bridge & Structural Steel**04/01/2024**

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:	07/01/2023	10/01/2023
	\$ 54.50	\$ 56.00
	+ 10.10*	+ 10.35*

ADDITIONAL \$6.50 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:	\$ 11.78	\$ 12.43
	+ 30.85*	+ 31.55*

* 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	\$ 21.80	\$ 22.40
	+ 4.04	+ 4.14
2nd year	\$ 32.70	\$ 33.60

	+ 6.06	+ 6.21
3rd year	\$ 43.60	\$ 44.80
	+ 8.08	+ 8.28
Supplemental Benefits - Per hour:		
1st year	\$.90	\$ 1.16
	+ 12.34	+ 12.62
2nd year	\$ 7.07	\$ 7.46
	+ 18.51	+ 18.93
3rd year	\$ 9.42	\$ 9.94
	+ 24.68	+ 25.24

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

Painter - Line Striping	04/01/2024
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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:

Painter (Striping-Highway):	07/01/2023	01/01/2024	07/01/2024
Striping-Machine Operator*	\$ 31.53	\$ 31.53	\$ 34.12
Linerman Thermoplastic	38.34	38.34	41.12

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.

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker:

Striping Machine Operator:	\$ 10.03	\$ 22.24	\$ 23.65
Linerman Thermoplastic:	10.03	22.24	23.65

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	\$ 15.00	\$ 15.00
2nd Term:	18.92	18.92	20.47
3rd Term:	25.22	25.22	27.30

Supplemental Benefits per hour:

1st term:	\$ 9.16	\$ 22.24	\$ 23.65
2nd Term:	10.03	22.24	23.65
3rd Term:	10.03	22.24	23.65

Painter - Metal Polisher

04/01/2024

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

07/01/2023

Metal Polisher	\$ 38.18
Metal Polisher*	39.28
Metal Polisher**	42.18

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Journeyworker:

All classification \$ 12.34

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, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year term at the following wage rates:

07/01/2023

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	\$ 8.69
2nd year	8.69
3rd year	8.69

8-8A/28A-MP

Plumber

04/01/2024

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)

	07/01/2023	05/01/2024	05/01/2025
		Additional	Additional
Plumber	\$ 38.59	\$ 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

\$ 36.07*

*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.

	07/01/2023
1st term	\$ 17.37
2nd term	21.23
3rd term	25.09
4th term	28.95
5th term	32.81

Supplemental Benefits per hour:

Apprentices

1st term	\$ 16.31*
2nd term	19.90*
3rd term	23.50*
4th term	27.10*
5th term	30.69*

*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

04/01/2024

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)	07/01/2023	05/01/2024
		Additional
Plumber/Steamfitter	\$ 49.95	\$ 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 \$ 44.57

*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.

	07/01/2023
1st term	\$ 17.49
2nd term	22.48
3rd term	27.48
4th term	32.47
5th term	39.96

Supplemental Benefits per hour:

1st term	\$ 15.69*
2nd term	20.14*
3rd term	24.57*
4th term	29.03*
5th term	35.67*

*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

04/01/2024

JOB DESCRIPTION Roofer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2023	05/01/2024
		Additional
Roofer/Waterproofer	\$ 46.50	\$2.50
	+ \$7.00*	

* 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: \$ 31.37

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 apprentices indentured prior to 01/01/2023

	1st	2nd	3rd	4th
	\$ 16.28	\$ 23.25	\$ 27.90	\$ 34.88
		+ 3.50*	+ 4.20*	+ 5.26*
Supplements:				
	1st	2nd	3rd	4th
	\$ 4.03	\$ 15.85	\$ 18.95	\$ 23.61

* This portion is not subjected to overtime premiums.

(1) year term apprentices indentured after 01/01/2023

1st	2nd	3rd	4th	5th
\$ 17.67	\$ 20.93	\$ 23.25	\$ 27.90	\$ 34.88
	+ 3.16*	+ 3.50*	+ 4.20*	+ 5.26

Supplements:

1st	2nd	3rd	4th	5th
\$ 7.61	\$ 14.29	\$ 15.85	\$ 18.95	\$ 23.61

* This portion is not subjected to overtime premiums.

9-8R

Sheetmetal Worker**04/01/2024**

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

	07/01/2023
SheetMetal Worker	\$ 47.00
	+ 3.60*

*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 \$ 45.62

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
\$ 17.50	\$ 19.67	\$ 21.87	\$ 24.05	\$ 26.24	\$ 28.44	\$ 31.10	\$ 33.75
+ 1.44*	+ 1.62*	+ 1.80*	+ 1.98*	+ 2.16*	+ 2.34*	+ 2.52*	+ 2.70*

*This portion is not subject to overtime premiums.

Supplemental Benefits per hour:

Apprentices

1st term	\$ 19.53
2nd term	21.99
3rd term	24.42
4th term	26.88
5th term	29.32
6th term	31.75
7th term	33.72
8th term	35.71

8-38

Sheetmetal Worker**04/01/2024**

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Sign Erector \$ 56.00

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Sign Erector \$ 55.66

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:

07/01/2023

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 14.95	\$ 16.95	\$ 18.93	\$ 20.93	\$ 28.56	\$ 31.05	\$ 33.57	\$ 36.05	\$ 38.56	\$ 41.05

4-137-SE

Sprinkler Fitter

04/01/2024

JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

Per hour 07/01/2023

Sprinkler \$ 50.86
Fitter

SUPPLEMENTAL BENEFITS

Per hour

Journey person \$ 30.19

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
\$ 24.77	\$ 27.53	\$ 30.03	\$ 32.78	\$ 35.53	\$ 38.29	\$ 41.04	\$ 43.79	\$ 46.54	\$ 49.30

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.74	\$ 8.74	\$ 20.32	\$ 20.32	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57
									1-669.2

Teamster - Building / Heavy&Highway

04/01/2024

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) 07/01/2023

GROUP 1	\$ 34.58
GROUP 1A	35.72
GROUP 2	34.02
GROUP 3	33.80
GROUP 4	33.69
GROUP 5	33.57
GROUP 6	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.

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects 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. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

First 40 hours	\$ 44.59
Over 40 hours	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

04/01/2024

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

Wages: 07/01/2023

Group 1 \$ 33.70
Group 2 29.70

Hazardous/Toxic Waste Removal additional 20% when personal protective equipment is required.

SUPPLEMENTAL BENEFITS

Per hour paid:

First 40 hours \$ 32.30
Over 40 hours 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

04/01/2024

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 07/01/2023

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 12226

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

☐ 10 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

☐ Fuel Delivery

☐ Guards, Watchmen

☐ Janitors, Porters, Cleaners,
Elevator Operators

☐ Moving furniture and
equipment

☐ Trash and refuse removal

☐ Window cleaners

☐ Other (Describe)

9. Does this project comply with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature



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://apps.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 04/05/2024

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	*****5784	A.J.M. TRUCKING, INC.		PO BOX 2064 MONROE NY 10950	02/12/2024	02/12/2029
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		ALL COUNTY SEWER & DRAIN, INC.		7 GREENFIELD DR WARWICK NY 10990	03/25/2022	03/25/2027
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 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	*****4231	ANKER'S ELECTRIC SERVICE, INC.		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL		ANTHONY MONGELLI		PO BOX 2064 MONROE NY 10950	02/12/2024	02/12/2029
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		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	DOL		B&L RENOVATION CO.		618 OCEAN PARKWAY APT A6BROOKLYN NY 11230	09/17/2020	09/17/2025
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	*****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	*****5078	BLACK RIVER TREE REMOVAL, LLC		29807 ANDREWS ROAD BLACK RIVER NY 13032	10/17/2023	10/17/2028
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
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	*****4083	C.P.D. ENTERPRISES, INC		P.O BOX 281 WALDEN NY 12586	03/03/2020	03/03/2025
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	*****4155	CASA BUILDERS, INC.	FRIEDLANDER CONSTRUCTI ON	64 N PUTT CONNERS ROAD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	AG	*****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC	*****2117	CHARAN ELECTRICAL ENTERPRISES		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	NYC		CHARLES ZAHRAKKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025

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DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		CRAIG JOHANSEN		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
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	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DANIEL ROBERT MCNALLY		7 GREENFIELD DRIVE WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DAVID FRIEDLANDER		64 NORTH PUTT CORNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DINA TAYLOR		64 N PUTT CONNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
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		EUGENIUSZ "GINO" KUCHAR		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
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	*****2998	G.E.M. AMERICAN CONSTRUCTION CORP.		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
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	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	DA		GIOVANNA TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA	*****0213	GORILLA CONTRACTING GROUP, LLC		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
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.M.J CONSTRUCTION		151 OSTRANDER AVENUE SYRACUSE NY 13205	11/21/2022	11/21/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027

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DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	12/12/2022	12/12/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
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	11/15/2022	11/15/2027
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	*****2435	JEFFEL D. JOHNSON	JMJ7 AND SON	5553 CAIRNSTRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JEFFEL JOHNSON ELITE CARPENTER REMODEL AND CONSTRUCTION		C2 EVERGREEN CIRCLE LIVERPOOL NY 13090	11/21/2022	11/21/2027
DOL	DOL	*****2435	JEFFREY M. JOHNSON	JMJ7 AND SON	5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		JMJ7 & SON CONSTRUCTION, LLC		5553 CAIRNS TRAIL LIVERPOOL NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 AND SONS CONTRACTORS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS		7014 13TH AVENUE BROOKLYN NY 11228	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS AND SONS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS, LLC		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
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	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		JOSEPH K. SALERNO		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL		JOSEPH K. SALERNO II		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
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	11/15/2022	11/15/2027
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

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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		JRN CONSTRUCTION CO, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
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		KEAN INDUSTRIES, LLC		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
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		KMA GROUP II, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL	*****1833	KMA GROUP INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KMA INSULATION, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KRIN HEINEMANN		2345 ROUTE 52, SUITE 2N HOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	NYC		KULWANT S. DEOL		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	AG	*****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
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, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026
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	DOL		MAQSOOD AHMAD		618 OCEAN PKWY BROOKLYN NY 11230	09/17/2020	09/17/2025
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
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

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DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
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	DOL	*****7790	NATIONAL BUILDING & RESTORATION CORP		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****1797	NATIONAL CONSTRUCTION SERVICES, INC		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NELCO CONTRACTING, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DA		NICHOLAS T. ANALITIS		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
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	11/15/2022	11/15/2027
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 ALLEN TOWN 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		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
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		PETER STEVENS		8269 21ST ST BELLEROSE NY 11426	12/22/2022	12/22/2027
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	07/11/2022	07/11/2027
DOL	DA	*****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
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		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	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
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 RD POMPEI NY 13138	07/16/2021	07/16/2026

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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	DA	*****0476	SAMCO ELECTRIC CORP.		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
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	DA		SILVANO TRAVAJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
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	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	*****9150	SURGE INC.		8269 21ST STREET BELLEROSSE NY 11426	12/22/2022	12/22/2027
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
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	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		TIMOTHY PERCY		29807 ANDREWS ROAD BLACK RIVER NY 13612	10/17/2023	10/17/2028
DOL	DA	*****1050	TRI STATE CONSTRUCTION OF NY CORP.		50-39 175TH PLACE FRESH MEADOWS NY 11365	03/28/2022	03/28/2027
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	*****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

NYSDOL Bureau of Public Work Debarment List 04/05/2024

Article 8

DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
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	*****8266	WILLIAM CHRIS MCLENDON	MCLENDON ASPHALT PAVING	1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM CHRIS MCLENDON		1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
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		XENOFON EFTHIMIADIS		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028

Section 00 73 73

Statutory and Funding-Financing Agency Requirements

Bound following this page are statutory requirements for the Project. These documents are part of the Contract Documents and consist of this page and the following:

Appendix A – Standard Clauses for NYS Projects

Appendix B – Hold Harmless Agreement

Appendix C – Apprenticeship Training/Project Labor Agreement Requirements

APPENDIX A

STANDARD CLAUSES FOR NEW YORK STATE CONTRACTS

PLEASE RETAIN THIS DOCUMENT
FOR FUTURE REFERENCE.

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STANDARD CLAUSES FOR NYS CONTRACTS

The parties to the attached contract, license, lease, amendment or other agreement of any kind (hereinafter, "the contract" or "this contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party other than the State, whether a contractor, licenser, licensee, lessor, lessee or any other party):

1. EXECUTORY CLAUSE. In accordance with Section 41 of the State Finance Law, the State shall have no liability under this contract to the Contractor or to anyone else beyond funds appropriated and available for this contract.

2. NON-ASSIGNMENT CLAUSE. In accordance with Section 138 of the State Finance Law, this contract may not be assigned by the Contractor or its right, title or interest therein assigned, transferred, conveyed, sublet or otherwise disposed of without the State's previous written consent, and attempts to do so are null and void. Notwithstanding the foregoing, such prior written consent of an assignment of a contract let pursuant to Article XI of the State Finance Law may be waived at the discretion of the contracting agency and with the concurrence of the State Comptroller where the original contract was subject to the State Comptroller's approval, where the assignment is due to a reorganization, merger or consolidation of the Contractor's business entity or enterprise. The State retains its right to approve an assignment and to require that any Contractor demonstrate its responsibility to do business with the State. The Contractor may, however, assign its right to receive payments without the State's prior written consent unless this contract concerns Certificates of Participation pursuant to Article 5-A of the State Finance Law.

3. COMPTROLLER'S APPROVAL. In accordance with Section 112 of the State Finance Law (or, if this contract is with the State University or City University of New York, Section 355 or Section 6218 of the Education Law), if this contract exceeds \$50,000 (or the minimum thresholds agreed to by the Office of the State Comptroller for certain S.U.N.Y. and C.U.N.Y. contracts), or if this is an amendment for any amount to a contract which, as so amended, exceeds said statutory amount, or if, by this contract, the State agrees to give something other than money when the value or reasonably estimated value of such consideration exceeds \$10,000, it shall not be valid, effective or binding upon the State until it has been approved by the State Comptroller and filed in his office. Comptroller's approval of contracts let by the Office of General Services is required when such contracts exceed \$85,000 (State Finance Law Section 163.6-a). However, such pre-approval shall not be required for any contract established as a centralized contract through the Office of General Services or for a purchase order or other transaction issued under such centralized contract.

4. WORKERS' COMPENSATION BENEFITS. In accordance with Section 142 of the State Finance Law, this

contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

5. NON-DISCRIMINATION REQUIREMENTS. To the extent required by Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex (including gender identity or expression), national origin, sexual orientation, military status, age, disability, predisposing genetic characteristics, marital status or domestic violence victim status. Furthermore, in accordance with Section 220-e of the Labor Law, if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, disability, sex, or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, Contractor agrees that neither it nor its subcontractors shall by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. Contractor is subject to fines of \$50.00 per person per day for any violation of Section 220-e or Section 239 as well as possible termination of this contract and forfeiture of all moneys due hereunder for a second or subsequent violation.

6. WAGE AND HOURS PROVISIONS. If this is a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Contractor's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in accordance with the Labor Law. Additionally, effective April 28, 2008, if this is a public work contract covered by Article 8 of the Labor Law, the Contractor understands and agrees that the filing of payrolls in a manner consistent with Subdivision 3-a of Section 220 of the Labor Law shall be a condition precedent to payment by the State of

any State approved sums due and owing for work done upon the project.

7. NON-COLLUSIVE BIDDING CERTIFICATION. In accordance with Section 139-d of the State Finance Law, if this contract was awarded based upon the submission of bids, Contractor affirms, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further affirms that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered to the State a non-collusive bidding certification on Contractor's behalf.

8. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with Section 220-f of the Labor Law and Section 139-h of the State Finance Law, if this contract exceeds \$5,000, the Contractor agrees, as a material condition of the contract, that neither the Contractor nor any substantially owned or affiliated person, firm, partnership or corporation has participated, is participating, or shall participate in an international boycott in violation of the federal Export Administration Act of 1979 (50 USC App. Sections 2401 et seq.) or regulations thereunder. If such Contractor, or any of the aforesaid affiliates of Contractor, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department or any other appropriate agency of the United States subsequent to the contract's execution, such contract, amendment or modification thereto shall be rendered forfeit and void. The Contractor shall so notify the State Comptroller within five (5) business days of such conviction, determination or disposition of appeal (2NYCRR 105.4).

9. SET-OFF RIGHTS. The State shall have all of its common law, equitable and statutory rights of set-off. These rights shall include, but not be limited to, the State's option to withhold for the purposes of set-off any moneys due to the Contractor under this contract up to any amounts due and owing to the State with regard to this contract, any other contract with any State department or agency, including any contract for a term commencing prior to the term of this contract, plus any amounts due and owing to the State for any other reason including, without limitation, tax delinquencies, fee delinquencies or monetary penalties relative thereto. The State shall exercise its set-off rights in accordance with normal State practices including, in cases of set-off pursuant to an audit, the finalization of such audit by the State agency, its representatives, or the State Comptroller.

10. RECORDS. The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract (hereinafter, collectively, "the Records"). The Records must be kept for the balance of the calendar year in which they were made and for six (6) additional years thereafter. The State Comptroller, the Attorney General and any other person or entity authorized to conduct an examination, as well as the agency or agencies involved in this

contract, shall have access to the Records during normal business hours at an office of the Contractor within the State of New York or, if no such office is available, at a mutually agreeable and reasonable venue within the State, for the term specified above for the purposes of inspection, auditing and copying. The State shall take reasonable steps to protect from public disclosure any of the Records which are exempt from disclosure under Section 87 of the Public Officers Law (the "Statute") provided that: (i) the Contractor shall timely inform an appropriate State official, in writing, that said records should not be disclosed; and (ii) said records shall be sufficiently identified; and (iii) designation of said records as exempt under the Statute is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, the State's right to discovery in any pending or future litigation.

11. IDENTIFYING INFORMATION AND PRIVACY NOTIFICATION.

(a) Identification Number(s). Every invoice or New York State Claim for Payment submitted to a New York State agency by a payee, for payment for the sale of goods or services or for transactions (e.g., leases, easements, licenses, etc.) related to real or personal property must include the payee's identification number. The number is any or all of the following: (i) the payee's Federal employer identification number, (ii) the payee's Federal social security number, and/or (iii) the payee's Vendor Identification Number assigned by the Statewide Financial System. Failure to include such number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or Claim for Payment, must give the reason or reasons why the payee does not have such number or numbers.

(b) Privacy Notification. (1) The authority to request the above personal information from a seller of goods or services or a lessor of real or personal property, and the authority to maintain such information, is found in Section 5 of the State Tax Law. Disclosure of this information by the seller or lessor to the State is mandatory. The principal purpose for which the information is collected is to enable the State to identify individuals, businesses and others who have been delinquent in filing tax returns or may have understated their tax liabilities and to generally identify persons affected by the taxes administered by the Commissioner of Taxation and Finance. The information will be used for tax administration purposes and for any other purpose authorized by law. (2) The personal information is requested by the purchasing unit of the agency contracting to purchase the goods or services or lease the real or personal property covered by this contract or lease. The information is maintained in the Statewide Financial System by the Vendor Management Unit within the Bureau of State Expenditures, Office of the State Comptroller, 110 State Street, Albany, New York 12236.

12. EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITIES AND WOMEN.

In accordance with Section 312 of the Executive Law and 5 NYCRR 143, if this contract is: (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of \$25,000.00,

whereby a contracting agency is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the contracting agency; or (ii) a written agreement in excess of \$100,000.00 whereby a contracting agency is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon; or (iii) a written agreement in excess of \$100,000.00 whereby the owner of a State assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project, then the following shall apply and by signing this agreement the Contractor certifies and affirms that it is Contractor's equal employment opportunity policy that:

(a) The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status, shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on State contracts and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. Affirmative action shall mean recruitment, employment, job assignment, promotion, upgradings, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation;

(b) at the request of the contracting agency, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein; and

(c) the Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the State contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

Contractor will include the provisions of "a", "b", and "c" above, in every subcontract over \$25,000.00 for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon (the "Work") except where the Work is for the beneficial use of the Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State. The State shall consider compliance by a contractor or subcontractor with the requirements of any federal law concerning equal employment

opportunity which effectuates the purpose of this section. The contracting agency shall determine whether the imposition of the requirements of the provisions hereof duplicate or conflict with any such federal law and if such duplication or conflict exists, the contracting agency shall waive the applicability of Section 312 to the extent of such duplication or conflict. Contractor will comply with all duly promulgated and lawful rules and regulations of the Department of Economic Development's Division of Minority and Women's Business Development pertaining hereto.

13. CONFLICTING TERMS. In the event of a conflict between the terms of the contract (including any and all attachments thereto and amendments thereof) and the terms of this Appendix A, the terms of this Appendix A shall control.

14. GOVERNING LAW. This contract shall be governed by the laws of the State of New York except where the Federal supremacy clause requires otherwise.

15. LATE PAYMENT. Timeliness of payment and any interest to be paid to Contractor for late payment shall be governed by Article 11-A of the State Finance Law to the extent required by law.

16. NO ARBITRATION. Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized), but must, instead, be heard in a court of competent jurisdiction of the State of New York.

17. SERVICE OF PROCESS. In addition to the methods of service allowed by the State Civil Practice Law & Rules ("CPLR"), Contractor hereby consents to service of process upon it by registered or certified mail, return receipt requested. Service hereunder shall be complete upon Contractor's actual receipt of process or upon the State's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Contractor must promptly notify the State, in writing, of each and every change of address to which service of process can be made. Service by the State to the last known address shall be sufficient. Contractor will have thirty (30) calendar days after service hereunder is complete in which to respond.

18. PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS. The Contractor certifies and warrants that all wood products to be used under this contract award will be in accordance with, but not limited to, the specifications and provisions of Section 165 of the State Finance Law, (Use of Tropical Hardwoods) which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by the State or any governmental agency or political subdivision or public benefit corporation. Qualification for an exemption under this law will be the responsibility of the contractor to establish to meet with the approval of the State.

In addition, when any portion of this contract involving the use of woods, whether supply or installation, is to be performed by any subcontractor, the prime Contractor will indicate and certify in the submitted bid proposal that the subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in §165 State Finance Law. Any such use must meet with the approval of the State; otherwise, the bid may not be considered responsive. Under bidder certifications, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of the State.

19. MACBRIDE FAIR EMPLOYMENT PRINCIPLES.

In accordance with the MacBride Fair Employment Principles (Chapter 807 of the Laws of 1992), the Contractor hereby stipulates that the Contractor either (a) has no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles (as described in Section 165 of the New York State Finance Law), and shall permit independent monitoring of compliance with such principles.

20. OMNIBUS PROCUREMENT ACT OF 1992. It is the policy of New York State to maximize opportunities for the participation of New York State business enterprises, including minority and women-owned business enterprises as bidders, subcontractors and suppliers on its procurement contracts.

Information on the availability of New York State subcontractors and suppliers is available from:

NYS Department of Economic Development
Division for Small Business
Albany, New York 12245
Telephone: 518-292-5100
Fax: 518-292-5884
email: opa@esd.ny.gov

A directory of certified minority and women-owned business enterprises is available from:

NYS Department of Economic Development
Division of Minority and Women's Business Development
633 Third Avenue
New York, NY 10017
212-803-2414
email: mwbecertification@esd.ny.gov
<https://ny.newnycontracts.com/FrontEnd/VendorSearchPublic.asp>

The Omnibus Procurement Act of 1992 requires that by signing this bid proposal or contract, as applicable, Contractors certify that whenever the total bid amount is greater than \$1 million:

(a) The Contractor has made reasonable efforts to encourage the participation of New York State Business Enterprises as suppliers and subcontractors, including certified minority and women-owned business enterprises, on this project, and has retained the documentation of these efforts to be provided upon request to the State;

(b) The Contractor has complied with the Federal Equal Opportunity Act of 1972 (P.L. 92-261), as amended;

(c) The Contractor agrees to make reasonable efforts to provide notification to New York State residents of employment opportunities on this project through listing any such positions with the Job Service Division of the New York State Department of Labor, or providing such notification in such manner as is consistent with existing collective bargaining contracts or agreements. The Contractor agrees to document these efforts and to provide said documentation to the State upon request; and

(d) The Contractor acknowledges notice that the State may seek to obtain offset credits from foreign countries as a result of this contract and agrees to cooperate with the State in these efforts.

21. RECIPROCITY AND SANCTIONS PROVISIONS.

Bidders are hereby notified that if their principal place of business is located in a country, nation, province, state or political subdivision that penalizes New York State vendors, and if the goods or services they offer will be substantially produced or performed outside New York State, the Omnibus Procurement Act 1994 and 2000 amendments (Chapter 684 and Chapter 383, respectively) require that they be denied contracts which they would otherwise obtain. NOTE: As of May 15, 2002, the list of discriminatory jurisdictions subject to this provision includes the states of South Carolina, Alaska, West Virginia, Wyoming, Louisiana and Hawaii. Contact NYS Department of Economic Development for a current list of jurisdictions subject to this provision.

22. COMPLIANCE WITH NEW YORK STATE INFORMATION SECURITY BREACH AND NOTIFICATION ACT. Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law Section 899-aa; State Technology Law Section 208).

23. COMPLIANCE WITH CONSULTANT DISCLOSURE LAW. If this is a contract for consulting services, defined for purposes of this requirement to include analysis, evaluation, research, training, data processing, computer programming, engineering, environmental, health, and mental health services, accounting, auditing, paralegal, legal or similar services, then, in accordance with Section 163 (4-g) of the State Finance Law (as amended by Chapter 10 of the Laws of 2006), the Contractor shall timely, accurately and properly comply with the requirement to submit an annual employment report for the contract to the agency that awarded

the contract, the Department of Civil Service and the State Comptroller.

24. PROCUREMENT LOBBYING. To the extent this agreement is a "procurement contract" as defined by State Finance Law Sections 139-j and 139-k, by signing this agreement the contractor certifies and affirms that all disclosures made in accordance with State Finance Law Sections 139-j and 139-k are complete, true and accurate. In the event such certification is found to be intentionally false or intentionally incomplete, the State may terminate the agreement by providing written notification to the Contractor in accordance with the terms of the agreement.

25. CERTIFICATION OF REGISTRATION TO COLLECT SALES AND COMPENSATING USE TAX BY CERTAIN STATE CONTRACTORS, AFFILIATES AND SUBCONTRACTORS.

To the extent this agreement is a contract as defined by Tax Law Section 5-a, if the contractor fails to make the certification required by Tax Law Section 5-a or if during the term of the contract, the Department of Taxation and Finance or the covered agency, as defined by Tax Law 5-a, discovers that the certification, made under penalty of perjury, is false, then such failure to file or false certification shall be a material breach of this contract and this contract may be terminated, by providing written notification to the Contractor in accordance with the terms of the agreement, if the covered agency determines that such action is in the best interest of the State.

26. IRAN DIVESTMENT ACT. By entering into this Agreement, Contractor certifies in accordance with State Finance Law §165-a that it is not on the "Entities Determined to be Non-Responsive Bidders/Offerers pursuant to the New York State Iran Divestment Act of 2012" ("Prohibited Entities List") posted at:
<http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf>

Contractor further certifies that it will not utilize on this Contract any subcontractor that is identified on the Prohibited Entities List. Contractor agrees that should it seek to renew or extend this Contract, it must provide the same certification at the time the Contract is renewed or extended. Contractor also agrees that any proposed Assignee of this Contract will be required to certify that it is not on the Prohibited Entities List before the contract assignment will be approved by the State.

During the term of the Contract, should the state agency receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, the state agency will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then the state agency shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not

limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

The state agency reserves the right to reject any bid, request for assignment, renewal or extension for an entity that appears on the Prohibited Entities List prior to the award, assignment, renewal or extension of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the Prohibited Entities list after contract award.

TOWN OF CLARKSTOWN
HOLD HARMLESS AGREEMENT

To the fullest extent provided by law, the Contractor and all of its employees and agents agrees to protect, defend, indemnify and hold the Town of Clarkstown and its officers, employees, and agents and save it harmless from and against any and all losses, penalties, damages, settlements, costs, charges, and professional fees or other expenses or liabilities of every kind and character arising out of or relating to any and all claims, liens, demands, obligations, actions, proceedings, or causes of action of every kind and character in connection with or arising directly or indirectly out of this agreement and/or the performance thereof. Without limiting the generality of the foregoing, any and all claims, etc., relating to personal injury, death, damage to property, defects in materials or workmanship, or any other violation of any applicable statute, ordinance, administrative order, rule or regulation or decree of any Court, shall be included in the indemnity hereunder, with the exception of claims, if any, caused by the sole negligence of the Town of Clarkstown.

The Contractor agrees to name the Town of Clarkstown an additional insured on its liability insurance policies by way of policy endorsement and provide the Town with Certificates of Insurance or other evidence of insurance as may be required by the Town.

Company Name_____

By: _____
(Signature)

Print Name & Title:_____

State of New York)
) ss. :
County of Rockland)

On the _____day of _____, in the year_____, before me, the undersigned, personally appeared _____personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that executed the same in capacity, and that by signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Notary Public

Apprenticeship Training / Project Labor Agreement Requirements

By way of Town Board Resolution dated July 18, 2023, the Town Board promotes the use of both Project Labor Agreements and apprenticeship training programs. That resolution follows in order to clarify the Town's requirements of contractors and sub-contracts.

WHEREAS, by Resolution No. 156-2010, adopted March 16, 2010, the Town Board rescinded Resolution 532-2009 and clarified its position with respect to the use of both Project Labor Agreements and apprenticeship training programs, and

WHEREAS, the Town Board now wishes to broaden the scope of the application of Project Labor Agreements/apprenticeship training programs to include field and ballpark projects; and conduct feasibility studies and implement the use of Project labor Agreement in Public Works Contract involving multiple trades for projects excess of \$4,000,000 in circumstance where doing so would be cost effective as demonstrated by the feasibility study, and

NOW, THEREFORE, be it RESOLVED, that the Clarkstown Purchasing Agent is hereby directed to incorporate the following language in the bid documents for said Public Works Contracts which replaces the existing language, to wit: "FURTHER RESOLVED, that the term "Public Works Contract," for the purposes of this resolution, shall mean any contract to which the Town of Clarkstown shall be a signatory which involves the construction, reconstruction, improvement, rehabilitation, installation, alteration, renovation, demolition of any building, facility, physical structure, field, ballpark, highway or bridge, including drainage projects, with a value in excess of \$250,000.00, and be it

FURTHER RESOLVED, that the Town shall also, as permitted by Section 222 of New York State Labor Law, conduct feasibility studies and implement the use of Project Labor Agreements in Public Works Contracts involving multiple trades for \$4,000,000 in circumstances where doing so would be cost effective as demonstrated by a feasibility study. To that end, the Town will undertake a feasibility study for such public works contracts meeting the aforesaid threshold limits to determine benefits, if any, that would accrue to the Town by the implementation of a PLA. If such benefits are found, such as promotion of work site harmony, prevention of costly delays resulting from strikes and lockouts, and provision for a dispute resolution mechanism to resolve labor and jurisdictional disputes, the PLA will be in the bid documents and the acceptance by the bidder will become a condition of the bid."

Bidder Company Name _____

By: _____(Signature)

Print Name & Title: _____

SECTION 01 12 13

SUMMARY OF WORK

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Table of Articles for this Section is:

<u>Article</u>	<u>Title</u>
1.1	Section Includes
1.2	Location and Description of Work
1.3	Construction Contracts, This Project
1.4	Construction Contracts, Other Projects
1.5	Work by Others
1.6	Work by OWNER
1.7	Sequence and Progress of Work
1.8	CONTRACTOR's Use of Site
1.9	Easements and Rights-of-Way
1.10	Notices to Owners and Authorities of Properties Adjacent to the Work
1.11	Salvage of Materials and Equipment
1.12	Partial Utilization by OWNER

1.2 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located at 12 Seeger Drive, Nanuet, NY. The facility is the existing Town of Clarkstown Highway Garage Complex. The proposed scope of work is the expansion of the existing highway garage building.
- B. The Work to be performed under this Contract includes, but is not limited to, constructing the Work described below and all related appurtenances. The Work includes, but is not limited to, the following:
1. Modifications to the existing highway garage including replacement of the existing trench drain at the main bay area, repair of portions of the CMU perimeter walls, and addition of a dry-pipe fire suppression system
 2. Installation pre-engineered building extension foundation and systems with a free standing lean-to covered parking structure. See also owner-furnished products.
 3. Site improvements to support the highway garage building expansion.
- C. Contracting Method: The Project will be constructed under multiple prime contracts.
- D. Hazardous Environmental Conditions:

1. To the best of Owner's knowledge, information, and belief, the prior use of the Site was unknown.

1.3 CONSTRUCTION CONTRACTS, THIS PROJECT

- A. The Contracts under which the Project will be constructed are:
 1. General Construction – Contract No. 1G: Consists of all Work shown, indicated, and required to complete the Project, except that specifically assigned to other prime contractors.
 - a. This Contract includes the Work specified in Divisions 01 through 14; Division 25; Divisions 27 through 32; Division 33 (excluding work under Section 33 70 00 through Section 33 79 99.99); and Divisions 34 through 48.
 - b. This Contract excludes Sections 33 70 00 through 33 79 99.99 and those portions of Section 40 05 96, Vibration, Seismic, and Wind Controls, specifically assigned to other prime contractors.
 2. Heating, Ventilating and Air Conditioning – Contract No. 1H: Consists of all Work required to complete the Project as shown and as specified in:
 - a. Division 01, General Requirements, except that Work specifically assigned to the other prime contractors.
 - b. Division 23, Heating, Ventilating, and Air Conditioning.
 - c. In Division 33, Utilities: Sections 33 60 00 through Section 33 69 99.99 for hydronic and steam energy utilities.
 - d. Those portions of Section 40 05 96, Vibration, Seismic, and Wind Controls, not specifically assigned to other prime contractors.
 - e. Other Specification Sections referenced in Division 23.
 3. Plumbing and Fire Protection – Contract No. 1P: Consists of all Work required to complete the Project as shown and as specified in:
 - a. Division 01, General Requirements, except that Work specifically assigned to the other prime contractors.
 - b. Division 21, Fire Suppression.
 - c. Division 22, Plumbing.
 - d. Those portions of Section 40 05 96, Vibration, Seismic, and Wind Controls, not specifically assigned to other prime contractors.
 - e. Other Specification Sections referenced in Divisions 21 and 22.
 4. Electrical – Contract No. 1E: Consists of all Work required to complete the Project as shown and as specified in:
 - a. Division 01, General Requirements, except that Work specifically assigned to the other prime contractors.
 - b. Division 26, Electrical.
 - c. In Division 33, Utilities: Sections 33 70 00 through Section 33 79 99.99.
 - d. Those portions of Section 40 05 96, Vibration, Seismic, and Wind Controls, not specifically assigned to other prime contractors.
 - e. Other Specification Sections referenced in Division 26, Electrical, or in those portions of Division 33, Utilities, that are responsibility of Electrical CONTRACTOR.

- f. Responsibility for excavation and backfilling, concrete, and other construction associated with the electrical Work, but specified under other Divisions, may be allocated in Section 26 05 05, General Provisions for Electrical Systems.

1.4 CONSTRUCTION CONTRACTS, OTHER PROJECTS

- A. Other construction contracts have been or will be awarded by OWNER that are in close proximity to or border on the Work of this Contract. Work under these other contracts is briefly described as follows:
 - 1. PEMB system as further defined in Section 01 64 00, Owner Furnished Products.

1.5 WORK BY OTHERS

- A. Non-Professional and Professional Services Contracted by OWNER: OWNER will retain services of the following entities to perform the services indicated relative to the Project. CONTRACTOR shall coordinate and schedule the Work with, and cooperate with, the entities performing the following services for OWNER.
 - 1. Testing and Code-Required Special Inspections:
 - a. OWNER has, or will, retain the services of a qualified testing laboratory to perform testing and code-required special inspections for the Work, in accordance with Section 01 45 33, Code-Required Special Inspections and Procedures, and selected other provisions of the Contract Documents related to field testing.

1.6 WORK BY OWNER

- A. OWNER will perform the following in connection with the Work:
 - 1. Operate all existing valves, gates, pumps, equipment, and appurtenances that will affect OWNER's operation, unless otherwise specified or indicated.

1.7 SEQUENCE AND PROGRESS OF WORK

- A. Requirements for sequencing and coordinating with OWNER's operations, including maintenance of facility operations during construction, and requirements for tie-ins and shutdowns, are in Section 01 14 16, Coordination with Owner's Operations.

1.8 CONTRACTOR'S USE OF SITE

- A. CONTRACTORS' use of the Site shall be confined to the areas shown.
- B. Move stored materials and equipment that interfere with operations of OWNER, other contractors, and others performing work for OWNER.
- C. Limits on CONTRACTOR's use of the Site are:
 - 1. As indicated in Section 01 14 19, Use of Site.

2. Do not use the Site for operations other than those required for the Project.

1.9 EASEMENTS AND RIGHTS-OF-WAY

A. General:

1. Easements and rights-of-way required for the permanent improvements included in the Work will be provided by OWNER in accordance with the General Conditions and Supplementary Conditions.
2. Confine construction operations within OWNER's property, public rights-of-way, easements obtained by OWNER, and limits shown, and property for which CONTRACTOR has made arrangements directly with property owner(s).
3. Use care in placing construction tools, equipment, excavated materials, and materials and equipment to be incorporated into the Work to avoid damaging property and interfering with traffic.
4. Do not enter private property outside the construction limits without permission from the owner of the property.

B. On Private Property:

1. General limits of OWNER-furnished easements are shown on the Drawings.

C. Within Highway and Railroad Rights-of-Way:

1. Permits required for the permanent facilities will be obtained by OWNER. CONTRACTOR shall obtain and pay for work permits and fees for safety and inspection forces to be furnished by the right-of-way owner.
2. Work performed and CONTRACTORS' operations within limits of railroad and highway rights-of-way shall comply with requirements of railroad or highway owner and applicable work permits, or authority having jurisdiction over right-of-way.
3. Comply with Section 01 14 33, Work in Highway Rights-of-Way, and Section 01 41 24, Permit Requirements.

1.10 NOTICES TO OWNERS AND AUTHORITIES OF PROPERTIES ADJACENT TO THE WORK

- A. Notify owners of adjacent property and utility owners when prosecution of the Work may affect their property, facilities, or use of property.
- B. When it is necessary to temporarily obstruct access to property, or when utility service connection will be interrupted, provide notices sufficiently in advance to enable affected persons to provide for their needs. Such notifications shall comply with Laws and Regulations and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit inconvenience caused thereby.

- C. Notify utility owners and other concerned entities not less than two business days prior to cutting or closing streets or other traffic areas or excavating near Underground Facilities or exposed utilities.

1.11 SALVAGE OF MATERIALS AND EQUIPMENT

- A. Existing materials and equipment removed and not shown or specified to be reused in the Work will become property of the prime CONTRACTOR responsible for such removal, except the following items that shall remain OWNER's property:
 - 1. None.
- B. Existing materials and equipment removed by CONTRACTOR shall not be reused in the Work, except for the following:
 - 1. None.
- C. Removal, Storage, Handling, Reinstallation:
 - 1. Carefully remove in manner to prevent damage all materials and equipment shown or indicated to be salvaged and reused or to remain property of OWNER.
 - 2. Store and protect salvaged items shown or indicated to be used in the Work.
 - 3. Replace in-kind or with new items those items of materials and equipment damaged during removal, storage, or handling through CONTRACTOR's actions, negligence, or improper procedures.
- D. CONTRACTOR may furnish and install new items, with ENGINEER's approval, instead of those specified or indicated to be salvaged and reused, in which case such removed items will become CONTRACTOR's property.

1.12 PARTIAL UTILIZATION BY OWNER

- A. Prior to Substantial Completion of the entire Work under each prime Contract, substantially complete the Work as follows:
 - 1. Work indicted for Milestones (if any).

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 13 13

MILESTONES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section describes Work to be substantially completed to comply with Milestones indicated in the Agreement. This Section is not intended to describe all the Work or its constraints, interrelationships, or sequential requirements required.
2. CONTRACTOR shall provide all labor, materials, equipment, tools, and incidentals required to perform the Work in accordance with the Contract Times provisions of the Contract Documents.
3. To achieve each Milestone indicated in this Section, substantially complete those elements of the Work indicated starting with Article 1.2 of this Section, together with related equipment, systems, and appurtenant Work and activities.
4. Comply with the General Conditions, as may be modified by the Supplementary Conditions, regarding partial utilization and property insurance.

1.2 MILESTONE REQUIREMENTS

A. Milestone 1 – Completion of the East Side Retaining Wall and Roadway:

1. Complete installation of the retaining wall and east side access roadway less the final top course paving.
2. Retaining wall and access road completed by 12/31/2024.

B. Milestone 2 – Start of Pavilion Demolition:

1. Demolition of the existing pavilion and foundation structure.
2. Start of demolition on or after 3/17/2025.

C. Milestone 3 - Garage Addition and Lean-to Foundation:

1. Provide garage addition and lean-to foundations for erection of the garage addition pre-engineered building erection by others.
2. Foundation and slab complete for building erection by 5/30/2025.

D. Milestone 4 – Garage Addition and Lean-to Erection by Others:

1. Erection of garage addition and lean-to completed by 8/1/2025 by others.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 14 16

COORDINATION WITH OWNER'S OPERATIONS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. This Section includes requirements for coordinating with OWNER's operations during the Project, and includes requirements for tie-ins and shutdowns necessary to complete the Work without impact on OWNER's operations except as allowed in this Section.
 - 2. CONTRACTOR shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to coordinate with OWNER's operations during the Work in accordance with this Section.
- B. Coordination:
 - 1. Review construction procedures under other Specifications sections and coordinate Work that will be performed with or before the Work specified in this Section.
- C. Related Sections:
 - 1. Section 01 12 13, Summary of Work.
 - 2. Section 01 73 24, Connections to Existing Facilities.
 - 3. Section 01 73 29, Cutting and Patching.
- D. Except for shutdowns specified in this Section, perform the Work such that OWNER's facilities remain in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not: impede OWNER's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, cause odors or other nuisances, or affect the public health, safety, and convenience.
- E. Work not specifically covered in this Section or in referenced Sections may, in general, be completed, within the Contract Times, at any time during regular working hours in accordance with the Contract Documents, subject to the requirements in this Section.
- F. As a substitute to the procedures specified in this Section, CONTRACTOR may propose providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to OWNER, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect OWNER's ability to comply with Laws and Regulations, permits, and operating

requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.

- G. Coordinate shutdowns with OWNER and ENGINEER. When possible, combine multiple tie-ins into a single shutdown to reduce impacts on OWNER's operations and processes.
- H. Operation of Existing Systems and Equipment during the Work:
 - 1. Do not shut off or disconnect existing operating systems or equipment, unless accepted by ENGINEER in writing.
 - 2. Operation of existing systems and equipment will be by OWNER unless otherwise specified or indicated.
 - 3. Where necessary for the Work, CONTRACTOR shall seal or bulkhead OWNER-operated gates and valves to prevent leakage that may affect the Work, OWNER's operations, or both.
 - 4. Provide temporary watertight plugs, bulkheads, and line stops as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of ENGINEER.

1.2 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Substitute Sequence Submittal: When deviation from specified sequence or procedures is proposed, furnish submittal explaining in detail the proposed sequence or procedures and associated effects, including evidence that OWNER's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents, by proposed substitution. List benefits of proposed substitution, including benefits to Progress Schedule. Submit in accordance with Section 01 25 00, Substitution Procedures, and other requirements of the Contract Documents regarding substitution requests.
- B. Informational Submittals: Submit the following:
 - 1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor, materials, and equipment required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for OWNER to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to ENGINEER not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining ENGINEER's acceptance of shutdown planning submittal.
 - 2. Shutdown Notification: After ENGINEER's acceptance of shutdown planning submittal and prior to starting the shutdown, submit written notification to OWNER and ENGINEER of date and time each shutdown is

to start. Submit notification not less than 48 hours in advance of each shutdown.

1.3 GENERAL CONSTRAINTS

- A. Indicated in the Contract Documents are the sequence and shutdown durations, where applicable, for OWNER'S equipment, systems, and conduits (including piping and ducting) that are to be taken out of service temporarily for the Work. New materials, equipment, and systems may be used by OWNER after the specified field quality controls and testing are successfully completed and the materials or equipment are Substantially Complete in accordance with the Contract Documents.
- B. The following constraints apply to coordination with OWNER's operations:
 - 1. Operational Access: OWNER'S personnel shall have access to equipment and areas of the facility that remain in operation.
 - 2. Temporary Partitions and Enclosures: Provide temporary partitions and enclosures necessary to maintain dust-free, heated, and ventilated spaces in areas of the facility that are adjacent to the Work and that must be kept operational. Comply with Section 01 51 05, Temporary Utilities.
 - 3. Schedule and perform equipment and system start-ups for Monday through Thursday. Equipment and systems shall not be placed into operation on Friday, Saturday, and Sunday without prior approval of OWNER, unless specifically indicated otherwise in the Contract Documents.
 - 4. Dead End Valves or Conduits: Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of conduits, including piping and ducting. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as directed by ENGINEER. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of conduit, including piping or ducting, also provide on downstream side of valve a blind flange with drain/flushing connection.

1.4 SEQUENCE OF WORK

- A. Perform the Work in the indicated sequence. Certain phases or stages of the Work may require working 24-hour days or work during hours outside of regular working hours. Work may be accelerated from a later stage to an earlier stage if OWNER's operations are not adversely affected by proposed sequence change, with ENGINEER's acceptance. Stages specified in this Article 1.4 are sequence-dependent.

1.5 SHUTDOWNS

- A. General:
 - 1. Terminology: A "shutdown" is when a portion of the normal operation of OWNER's facility, whether equipment, systems, conduit (including piping

and ducting), has to be temporarily suspended or taken out of service to perform the Work.

2. Work that may interrupt normal operations shall be accomplished at times convenient to OWNER unless otherwise indicated in the Contract Documents.
3. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, materials, equipment, spare parts, both temporary and permanent, necessary to successfully perform the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to commencing the associated shutdown. Demonstrate to ENGINEER's satisfaction that CONTRACTOR has complied with such requirements before commencing the shutdown.
4. If CONTRACTOR's operations cause an unscheduled interruption of OWNER's operations, immediately re-establish satisfactory operation for OWNER.
5. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of OWNER's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by CONTRACTOR if, in ENGINEER's opinion, CONTRACTOR did not comply with requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in performing the Work and complying with applicable permits, Laws, and Regulations.
6. Shutdowns shall be in accordance with Table 01 14 16-B of this Section. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
7. Temporary, short-term shutdowns of smaller conduits (including piping and ducting), equipment, and systems may not be included in Table 01 14 16-B. Coordinate requirements for such shutdowns with ENGINEER and OWNER. Where necessary, obtain ENGINEER's interpretation or clarification before proceeding.

B. Shutdowns of Electrical Systems:

1. Comply with Laws and Regulations, including the National Electric Code.
2. CONTRACTOR shall lock out and tag circuit breakers and switches operated by OWNER and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started.
3. Upon completion of shutdown Work, remove the locks and tags and notify ENGINEER that facilities are available for use.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. In addition to requirements of this Section, comply with Section 01 73 29, Cutting and Patching, and Section 01 73 24, Connections to Existing Facilities, and other Contract Documents applicable to Work associated with shutdowns, tie-ins, temporary pumping (where applicable), and similar work.

+ + END OF SECTION + +

SECTION 01 14 19

USE OF SITE

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for use of the Site during the Project, and includes requirements for use of existing facilities, as applicable.
2. CONTRACTOR shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to comply with restrictions on CONTRACTOR's use of the Site and other areas.
3. Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions, regarding the CONTRACTOR's use of the Site and other areas.

1.2 USE OF PREMISES

A. Limit use of premises at the Site to work areas shown or indicated on the Drawings and as specified in this Section. Do not disturb portions of the Site beyond areas of the Work.

1. Limits:

- a. Confine construction operations to the following areas:
 - 1) Limits of work as shown on the Contract Drawings.
 - b. Confine storage of materials and equipment, and locations of temporary facilities to the following areas:
 - 1) Limits of work as shown on the Contract Drawings.
 - c. Do not enter the following areas:
 - 1) Areas outside of the work areas indicated in Paragraph 1.2.A.1.a of this Section and outside of work areas indicated on the Drawings, including outside the Project areas indicated on the "key plan" in the Drawings.
2. Access to Site, Access Roads, and Parking Areas: Refer to Section 01 55 13, Access Roads and Parking Areas.

B. Use of Existing Buildings and Structures: Maintain existing buildings and structures in weather-tight condition throughout construction unless otherwise indicated in the Contract Documents. Protect buildings, structures, and occupants during construction.

1. Use of Existing Utilities, Sanitary Facilities, and First-aid Facilities: Refer Section 01 51 05, Temporary Utilities.

- C. Promptly repair damage to premises caused by construction operations. Upon completion of the Work, restore premises to specified condition; if condition is not specified, restore to pre-construction condition.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 14 33

WORK IN HIGHWAY RIGHTS-OF-WAY

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall obtain necessary permits, arrange and pay for inspections required by the highway owner, and pay all charges for the Work in the associated highway right-of-way. Comply with applicable rules and regulations of highway owner.
2. Obtain required permits prior to commencing work in the associated right-of-way.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Copies of work permits obtained from owner of each right-of-way.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Materials shall be in accordance with shall comply with requirements of highway owner and the Contract Documents, including Specifications in Divisions 31 and 32, and others as applicable.

PART 3 – EXECUTION

3.1 PREPARATION AND PROTECTION

- A. CONTRACTOR shall implement means necessary to prevent accidents caused or influenced by the Work. Provide flagmen, temporary barricades, temporary lights, temporary signs, and other precautions to provide safe conditions during the Work.

3.2 INSTALLATION

- A. Work shall be located as shown on the Drawings. Provide materials, equipment, piping, and appurtenances required for crossings of existing Underground Facilities and above-ground utilities and structures. Furnish and maintain at the Site a supply of pipe fittings, adapters, and short lengths of pipe to expedite utility crossings required.

B. Pavement:

1. When fill is stabilized in accordance with requirements of highway owner and the Contract Documents, replace highway subbase material and pavement with pavement of similar type and equal thickness to the pavement in place prior to start of the Work.
2. Paving installation shall comply with requirements of highway owner and the Contract Documents.

+ + END OF SECTION + +

SECTION 01 21 00

CONTINGENCY ALLOWANCES

PART 1 – GENERAL

1.1 SCOPE

- A. Scope:
 - 1. This Section includes administrative and procedural requirements governing contingency allowances:
- B. Authorization of Allowances:
 - 1. Work that will be paid under an allowance will be authorized in Owner's written instruction to Contractor using the form included with this Section or other written allowance authorization issued by Owner.
 - 2. Do not perform Work under an allowance without written authorization of Owner.

1.2 CONTINGENCY ALLOWANCE

- A. Contingency allowances are stipulated amounts available as reserve for sole use by Owner to cover unanticipated costs.
- B. When authorization of Work under contingency allowance is contemplated by Owner for a defined scope, submit Change Proposal to Engineer. Prepare Change Proposal in accordance with the General Conditions and Supplementary Conditions and Section 01 26 00, Contract Modification Procedures, except those payments within limit of contingency allowance shall exclude cost of bond and insurance premiums.

1.3 SCHEDULE OF ALLOWANCES

- A. Contingency Allowances:
 - 1. Schedule of Contingency Allowances: Include the following allowances for use in accordance with Owner's instructions:

Contract and Bid/Payment Item No.	Allowance Amount
1G - General	\$ 75,000.00
1E – Electrical	\$ 10,000.00
1H – HVAC	\$ 5,000.00
1P – Plumbing and Fire Protection	\$ 25,000.00

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ATTACHMENTS

- A. The document listed below and attached following this Section's "End of Section" designation, are part of this Specification Section.
 - 1. Allowance Authorization Form (one page).

+ + END OF SECTION + +

ALLOWANCE AUTHORIZATION

Project: _____ Authorization Number: _____

To: _____ From: _____

Re: _____ Date: _____

Engineer Project No.: _____
Contract For: _____

You are authorized to perform the following item(s) of Work and to adjust the Contract allowance amount accordingly:

1. [Allowance Title] / [Title of Change]:

THIS IS NOT A CHANGE ORDER AND DOES NOT INCREASE OR DECREASE THE CONTRACT PRICE

Original Allowance	\$	_____
Allowance Expenditures prior to this Authorization	\$	_____
Allowance Balance prior to this Authorization	\$	_____
Allowance will be decreased by this Authorization	\$	_____
New Allowance Balance	\$	_____

RECOMMENDED BY

ARCADIS U.S., Inc.
Engineer _____

By _____ Date _____

OWNER APPROVAL

Owner _____

By _____ Date _____

CONTRACTOR ACCEPTANCE

Contractor _____

By _____ Date _____

☐ Attachments

Copies: ☐ Owner ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ File

SECTION 01 22 13

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Scope:

1. Items listed starting in Article 1.4 of this Section refer to and are the same pay items listed in the Bid Form and constitute all pay items for completing the Work.
2. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant or facility services, Contractor's or Engineer's field offices, layout surveys, Project signs, sanitary requirements, testing, safety provisions and safety devices, submittals and record drawings, water supplies, power and fuel, maintenance of traffic, removal of waste, security, coordination with Owner's operations, information technology (including hardware, software, and services) required during construction, commissioning where specified, bonds, insurance, or other requirements of the General Conditions, Supplementary Conditions, Division 01 Specifications, and other requirements of the Contract Documents.
3. Compensation for all services, items, materials, and equipment shall be included in prices stipulated for lump sum and unit price pay items listed in this Section and included in the Contract.

1.2 RELATED PROVISIONS

- A. Payments to Contractor: Refer to General Conditions, Supplementary Conditions, Agreement, and Section 01 29 76, Progress Payment Procedures.
- B. Changes in Contract Price: Refer to General Conditions, Supplementary Conditions, and Section 01 26 00, Contract Modification Procedures.
- C. Schedule of Values: Refer to General Conditions, Supplementary Conditions, and Section 01 29 73, Schedule of Values.

1.3 CONTRACT NO. 1 – GENERAL CONSTRUCTION

A. Item 1.1 – General Construction:

1. Measurement and Payment: Lump sum payment for Item 1.1 will be full compensation for completing the Work, as shown or indicated under Contract 1G - General. Additional work items that Contractor may be ordered by Engineer to perform are described below.

B. Item 1.2 – Contingency Allowance:

1. Measurement: Section 01 21 00, Allowances, includes a stipulated amount available as reserve for sole use by Owner to cover unanticipated costs.
2. Payment: Payment for Work authorized under Item 1.2 will be full compensation for providing all Work authorized under the contingency allowance, complete as shown, indicated, or directed by Engineer. Work authorized under contingency allowance may be included in subsequent Application(s) for Payment, as applicable, following authorization of and performance of contingency allowance Work.

1.4 CONTRACT NO. 1H – HEATING, VENTILATING, AND AIR CONDITIONING

A. Item 1.1 – Heating, Ventilating, and Air Conditioning Construction:

1. Measurement and Payment: Lump sum payment for Item 2.1 will be full compensation for completing the Work as shown and indicated under Contract No. 1H, Heating, Ventilating, and Air Conditioning.

B. Item 1.2 – Contingency Allowance:

1. Measurement: Section 01 21 00, Allowances, includes a stipulated amount available as reserve for sole use by Owner to cover unanticipated costs.
2. Payment: Payment for Work authorized under Item 1.2 will be full compensation for providing all Work authorized under the contingency allowance, complete as shown, indicated, or directed by Engineer. Work authorized under contingency allowance may be included in subsequent Application(s) for Payment, as applicable, following authorization of and performance of contingency allowance Work.

1.5 CONTRACT NO. 1P – PLUMBING AND FIRE PROTECTION

A. Item 1.1 – Plumbing and Fire Protection:

1. Measurement and Payment: Lump sum payment for Item 3.1 will be full compensation for completing the Work as shown and indicated under Contract No. 1P, Plumbing and Fire Protection.

B. Item 1.2 – Contingency Allowance:

1. Measurement: Section 01 21 00, Allowances, includes a stipulated amount available as reserve for sole use by Owner to cover unanticipated costs.
2. Payment: Payment for Work authorized under Item 1.2 will be full compensation for providing all Work authorized under the contingency allowance, complete as shown, indicated, or directed by Engineer. Work authorized under contingency allowance may be included in subsequent Application(s) for Payment, as applicable, following authorization of and performance of contingency allowance Work.

1.6 CONTRACT NO. 1E – ELECTRICAL

A. Item 1.1 – Electrical Construction:

1. Measurement and Payment: Lump sum payment for Item 4.1 will be full compensation for completing the Work as shown and indicated under Contract No. 1E, Electrical. Additional work items that Contractor may be ordered by Engineer to perform are described below.
- B. Item 1.2 – Contingency Allowance:
1. Measurement: Section 01 21 00, Allowances, includes a stipulated amount available as reserve for sole use by Owner to cover unanticipated costs.
 2. Payment: Payment for Work authorized under Item 1.2 will be full compensation for providing all Work authorized under the contingency allowance, complete as shown, indicated, or directed by Engineer. Work authorized under contingency allowance may be included in subsequent Application(s) for Payment, as applicable, following authorization of and performance of contingency allowance Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope: Section includes:
 - 1. Administrative and procedural requirements for selecting materials and equipment for the Project.
 - 2. Procedural requirements for substitutions of materials and equipment.
 - 3. Procedural requirements for substitute construction methods or procedures, when construction methods or procedures are specified.
- B. A proposed substitute will not be accepted for review if:
 - 1. Approval would require changes in design concept or a substantial revision of the Contract Documents.
 - 2. Approval would delay completion of the Work or the work of other contractors.
 - 3. Substitution request is indicated or implied on a Shop Drawing or other submittal, or on a request for interpretation or clarification, and is not accompanied by CONTRACTOR's formal and complete request for substitution.
- C. If proposed substitute is not approved, CONTRACTOR shall provide the specified materials, equipment, method, or procedure, as applicable.
- D. Approval of a substitute does not relieve CONTRACTOR from requirement for submitting Shop Drawings and other submittals in accordance with the Contract Documents.
- E. ENGINEER and OWNER have the right to rely upon the completeness and accuracy of the information included in CONTRACTOR's request for approval of a substitute, and CONTRACTOR accepts full responsibility for the completeness and accuracy thereof.
- F. When approved substitute is defective or fail to perform in accordance with the Contract Documents, responsibility for remedying the defect or failure resides solely with CONTRACTOR and Supplier.

1.2 SUBSTITUTE MATERIALS AND EQUIPMENT

- A. Requests for approval of substitute items of materials or equipment will be considered within a period of 30 days after the Effective Date of the Contract. After the end of specified period, substitution requests will be considered only in case of

unavailability of a specified item of material or equipment or other conditions beyond CONTRACTOR's control.

B. Procedure:

1. Submit requests for substitution in accordance with requirements for furnishing submittals, as indicated in Section 01 33 00, Submittal Procedures.
2. Submit separate request for each proposed substitute.
3. Submit request for substitution using forms attached to this Section. Complete all information requested on each form, and enclose with the forms supplementary information as required. In addition to requirements of the General Conditions and information required on substitution request forms, include with each substitute request the following:
 - a. Identification of the materials and equipment (as applicable), including manufacturer's name and address.
 - b. Manufacturer's literature with description of the materials and equipment, performance and test data, and reference standards with which materials and equipment comply.
 - c. Samples, when appropriate.
 - d. Name and address of similar projects on which the materials and equipment were used, date of installation, and names and contact information (including telephone number) for the facility operations and maintenance manager.

1.3 SUBSTITUTE CONSTRUCTION METHODS OR PROCEDURES

- A. Where construction methods or procedures are specified, for a period of 30 days after the Effective Date of the Contract, ENGINEER will consider CONTRACTOR's written requests for substitute construction methods or procedures shown or specified in the Contract Documents.
- B. The provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding substitute items of materials and equipment are hereby extended to apply to substitute construction methods or procedures.
- C. Procedure:
 1. Submit requests for substitution in accordance with requirements for furnishing submittals, as indicated in Section 01 33 00, Submittal Procedures.
 2. Submit separate request for each proposed substitute.
 3. Submit request for substitution using forms attached to this Section. Complete all information requested on each form, and enclose with the forms supplementary information as required. In addition to requirements of the General Conditions and information required on substitution request forms, include with each substitute request the following:
 - a. Detailed description of proposed method or procedure.
 - b. Itemized comparison of the proposed substitution with the specified method or procedure.
 - c. Drawings illustrating method or procedure.

- d. Other data required by ENGINEER to establish that proposed substitution is equivalent to specified method or procedure.

1.4 CONTRACTOR'S REPRESENTATIONS

- A. In submitting request for substitution, CONTRACTOR represents that:
 1. CONTRACTOR has read and fully understands the provisions regarding substitutes as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 2. Substitution request is complete and includes all information required by the Contract Documents.
 3. CONTRACTOR certifications required by the General Conditions, as may be modified by the Supplementary Conditions, are valid and made with CONTRACTOR's full knowledge, information, and belief.
 4. CONTRACTOR will provide the same or better guarantees or warranties for proposed substitute as for the specified materials, equipment, methods, or procedures, as applicable.
 5. CONTRACTOR waives all Claims for additional costs or extension of time related to proposed substitute that subsequently may become apparent.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, and attached following this Section's "End of Section" designation, are part of this Specification Section.
 1. Substitution Request Form (two pages).
 2. Product Substitution Checklist (one page).

+ + END OF SECTION + +

SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____

Engineer Project. No. _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitute: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
Installer: _____ Address: _____ Phone: _____
History: ☐ New product ☐ 1 to 4 years old ☐ 5 to 10 years old ☐ More than 10 years old

Differences between proposed substitute and specified item: _____

☐ Point-by-point comparative data attached — REQUIRED BY THE CONTRACT DOCUMENTS

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Engineer: _____
Address: _____ Owner: _____
_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Savings to Owner for accepting substitute: _____ (\$ _____)
(attach detailed, itemized estimate)

Proposed substitute changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.
(clarify whether change is to Substantial Completion, Milestone, or time for readiness for final payment)

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST

(Continued)

☐ Substitute product, method, or procedure is subject to payment of licensing fee or royalty (check if “yes” and attach information)

☐ Substitute product, method, or procedure is patented or copyrighted (check if “yes” and attach information)

The undersigned certifies:

- Representations in the General Conditions and in Section 01 25 00, Substitution Procedures, regarding substitutions are valid.
- Same or better warranty and guarantee will be furnished for proposed substitution as for specified item.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitute will have no adverse effect on other trades and will not affect or delay Progress Schedule.
- Cost data as stated above is complete. Claims for additional costs or time related to accepted substitution which may subsequently become apparent are waived.
- Proposed substitute does not affect dimensions and functional clearances.
- Payment will be made for Engineer’s review and changes, if any, to the design and Contract Documents, and construction costs caused by the substitute.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: ☐

ENGINEER’S REVIEW AND ACCEPTANCE (OR NON-ACCEPTANCE) WILL BE DOCUMENTED IN A FIELD ORDER OR CHANGE ORDER, AS APPROPRIATE. _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ Engineer
☐ Other:

PRODUCT SUBSTITUTION CHECKLIST

Date: _____ Re: _____

Engineer Proj No.: _____ Manufacturer's Project No.: _____

Filing No.: _____ Contract For: _____

Item Equivalence:

- ☐ Is the submitted item equivalent to the specified item? _____
- ☐ Does it serve the same function? _____
- ☐ Does it have the same dimensions? _____
- ☐ Does it have the same appearance? _____
- ☐ Will it last as long? _____
- ☐ Does it comply with the same codes, and standards and performance requirements? _____
- ☐ Has the item been used locally, and where are the projects? _____

- ☐ Has a problem occurred with the item, and what was the remedy? _____

Effect on the Project:

- ☐ Will the substitute affect other aspects of the construction? _____
- ☐ Are any details affected and are changes required? _____
- ☐ What is the cost of the changes? _____
- ☐ Who pays for the required changes? _____
- ☐ Are Contract Times affected? _____

Effect on the Warranty:

- ☐ How does the proposed warranty differ from the specified warranty? _____

- ☐ Does the manufacturer have a track record of standing behind the warranty? _____

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

- A. Scope.
 - 1. This Section includes administrative and procedural requirements governing the following:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Minor changes in the Work and Field Orders.
 - d. Work Change Directives.
 - e. Proposal requests.
 - f. Change Proposals.
 - g. Change Orders.
- B. Submit Contract modification documents to Engineer, addressed to the contact person and contact information indicated in Section 01 33 00, Submittal Procedures, and in accordance with Section 01 31 26, Electronic Document Protocol.

1.2 REQUESTS FOR INTERPRETATION

- A. General.
 - 1. Do not transmit request for interpretation when another form of communication is appropriate, such as Contractor's submittals, requests for approvals of substitutes, notices, ordinary correspondence, or other form of communication. Improperly prepared or inappropriate requests for interpretation will be returned without response or action by Engineer.
 - 2. Do not submit request for interpretation or clarification when:
 - a. answer may be obtained by observations at the Site; or
 - b. required information is clearly indicated in the Contract Documents; or
 - c. required information is included in industry standards referenced in the Contract Documents or Supplier's instructions that are consistent with the Contract Documents; or
 - d. answers are reasonably inferable from any of foregoing.
 - 3. Contractor shall have sole financial responsibility for requests for interpretations or clarifications that are submitted late.
- B. Procedure.

1. Transmit requests for interpretation to Engineer in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Include with each request for interpretation a separate letter of transmittal.
2. Engineer's response to requests for interpretation will be transmitted in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Each response to a request for interpretation will include a separate letter of transmittal.
3. Engineer's written response to each request for interpretation will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
4. If Engineer requests additional information to make an interpretation, entity requesting the interpretation shall transmit the information requested within ten days, unless Engineer allows additional time, via correspondence referring to request for interpretation number.
5. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's interpretation, advise Engineer in writing before proceeding with the Work associated with the request for interpretation.
6. If, after this initial communication, either Owner or Contractor believes that change in Contract Price or Contract Times, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.

C. Preparation of Requests for Interpretation:

1. Prepare each request for interpretation on the "Request for Interpretation" form included with this Section, or other form acceptable to Engineer.
2. Numbering system for Requests for Information shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First request for interpretation on the general contract for project titled, "Contract A15" would be, "RFI No. A15-GC-001".
3. In space provided on form, describe the interpretation requested. Provide additional sheets as necessary. Include text and sketches as required in sufficient detail to describe the need for an interpretation.
4. When applicable, request for interpretation shall include Contractor's recommended resolution.

1.3 WRITTEN CLARIFICATIONS

A. General:

1. Written clarifications, when required, will be initiated and issued by Engineer.
2. Written clarifications do not change the Contract Price or Contract Times, and do not alter the Contract Documents.

B. Procedure.

1. Engineer's written clarifications will be transmitted as correspondence in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section.
2. Each written clarification will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
3. If Contractor or Owner believes that a change in the Contract Price or Contract Times, or other change to the Contract is required as a result of Engineer's written clarification, advise Engineer in writing before proceeding with the Work associated with the written clarification.
4. If, after this initial communication, either Owner or Contractor believes that change in Contract Price or Contract Times, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
5. If Engineer's written clarification is unclear, prepare and transmit a request for interpretation.

1.4 MINOR CHANGES IN THE WORK AND FIELD ORDERS

A. General:

1. Field Orders, when required, will be initiated and issued by Engineer in the form of Engineers Joint Contract Documents Committee document EJCDC® C-942, "Field Order".

B. Procedure.

1. Field Orders will be transmitted in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Each Field Order will include a separate letter of transmittal.
2. Each Field Order will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
3. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of a Field Order, so advise Engineer in writing before proceeding with the Work associated with the Field Order.
4. If, after this initial communication, Contractor believes that change in Contract Price or Contract Times, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
5. If the Field Order is unclear, submit request for interpretation.

1.5 WORK CHANGE DIRECTIVES

A. General:

1. Work Change Directives will be in the form of EJCDC® C-940, “Work Change Directive”.
- B. Procedure.
1. Work Change Directives signed by Owner and Engineer will be transmitted in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Each Work Change Directive will include a separate letter of transmittal. Contractor shall print three originals of Work Change Directive for Contractor’s signature.
 2. Contractor shall promptly sign each original Work Change Directive and, within five days of receipt, return all originals to Engineer.
 3. Original, signed Work Change Directives will be distributed as follows:
 - a. Contractor: One original.
 - b. Owner: One original.
 4. One copy of each Work Change Directive will be distributed to:
 - a. Resident Project Representative (RPR).
 5. Transmit documentation of costs to Engineer as a Change Proposal.

1.6 PROPOSAL REQUESTS

- A. General:
1. Proposal Requests are for requesting the effect on the Contract Price or Contract Times and other information relative to contemplated changes in the Work. Proposal Requests do not authorize changes or variations in the Work, and do not change the Contract Price or Contract Times or terms of the Contract.
 3. Proposal Requests will be issued by Engineer using the “Proposal Request” form included with this Section.
- B. Procedure.
1. Proposal Requests will be transmitted in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Each Proposal Requests will include a separate letter of transmittal.
 2. Each signed Proposal Request will be transmitted to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 3. Transmit request for interpretation to clarify conflicts, errors, ambiguities, and discrepancies in Proposal Request.
 4. Upon receipt of Proposal Request prepare and transmit to Engineer a Change Proposal for the proposed Work described in the Proposal Request.

1.7 CHANGE PROPOSALS

- A. General.
1. Change Proposals shall be submitted on the “Change Proposal” form included with this Section.

B. Procedure.

1. Transmit Change Proposals in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Include with each Change Proposal all required supporting documentation and a separate letter of transmittal.
2. Engineer's Review and Requests for Additional Information:
 - a. When Engineer requests additional information to render a decision, submit required information within five days of receipt of Engineer's request, unless Engineer allows more time. Submit the required information via correspondence that refers to the specific Change Proposal number.
 - b. Owner will transmit to Engineer such comments, if any, that Owner has on the Change Proposal, within 10 days of Owner's receipt of the Change Proposal.
 - c. Engineer's response to Change Proposals will be transmitted in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section, the General Conditions, and the Supplementary Conditions.
3. Engineer's response to each Change Proposal will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
4. If Change Proposal is recommended for approval by Engineer and is approved by Owner, a Change Order will be issued or, when applicable, an appropriate use of contingency allowance will be authorized by Owner.

C. Preparation of Change Proposals:

1. Numbering system for Change Proposals shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First Change Proposal for the general contract for project named "Contract A15" would be, "Change Proposal No. A15-GC-001".
2. In space provided on Change Proposal form:
 - a. Describe scope of each proposed change. Include text and sketches on additional sheets as required to provide detail sufficient for Engineer's review and response. If a change item is submitted in response to Proposal Request, write in as scope, "In accordance with Proposal Request No." followed by the Proposal Request number.
 - b. Submit justification for each proposed change. If change is in response to proposal request, write in as justification, "In accordance with Proposal Request No." followed by the proposal request number.
 - c. List the total change in the Contract Price and Contract Times for each separate change item included in the Change Proposal.
3. Unless otherwise directed by Engineer, attach detailed breakdowns of pricing to the Change Proposal.

1.8 CHANGE ORDERS

- A. General:
 - 1. Change Orders will be in the form of EJCDC® C-941, “Change Order”.
- B. Procedure.
 - 1. Change Orders for signature by Contractor will be transmitted in accordance with Section 01 31 26, Electronic Document Protocol, and requirements of this Section. Each Change Order will include a separate letter of transmittal. Contractor shall print three originals of Change Order for Contractor’s signature.
 - 2. Contractor shall promptly sign each original Change Order and, within five days of receipt, return all originals to Engineer.
 - 3. Engineer will sign each original Change Order and forward them to Owner.
 - 4. After approval and signature by Owner, original Change Orders will be distributed as indicated below.
 - 5. Original, signed Change Orders will be distributed as follows:
 - a. Contractor: One original.
 - b. Owner: One original.
 - 6. One copy of each Change Order will be distributed to:
 - a. Resident Project Representative (RPR).

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below, following this Section’s “End of Section” designation, are part of this Specifications Section:
 - 1. Request for Interpretation form (one page).
 - 2. Proposal Request form (one page).
 - 3. Change Proposal form (one page).

+ + END OF SECTION + +

REQUEST FOR INTERPRETATION

Owner: _____

Project Name: _____

Contractor: _____ RFI No. _____

Date Transmitted: _____ Date Received: _____

Date Response Requested: _____ Date Response Transmitted: _____

Subject: _____

Specification Section and Paragraph: _____

Drawing References: _____

INTERPRETATION REQUESTED:

Signature: _____ Date: _____

ENGINEER'S RESPONSE:

Signature: _____ Date: _____

PROPOSAL REQUEST



Owner: _____

Project Name: _____

Proposal Request No.: _____ Date: _____

Contract Name and No.: _____

Contractor: _____

Other Contracts Involved in Proposed Change: _____

TO CONTRACTOR: Please submit a complete Change Proposal for the proposed modifications described below. If the associated Change Proposal is approved, a Change Order or allowance authorization will be issued to authorize adjustment so the scope of the Work. **This Proposal Request is not a Change Order, Work Change Directive, Field Order, or an authorization to proceed with the proposed Work described below.**

SCOPE OF PROPOSED WORK:

1. *Item:*

2. *Item:*

3. *Item:*

Proposal requested by: _____

Signature of Requestor: _____

CHANGE PROPOSAL



Owner: _____

Project Name: _____

Change Proposal No.: _____ Date: _____

Submitted in Response to Proposal Request No.: _____

Contract Name and No.: _____

Contractor: _____

Subject: _____

The following changes to the Contract are proposed:

SCOPE OF WORK: *(attach and list supporting information as required)*

1. *Item:*

2. *Item:*

JUSTIFICATION:

1. *Item:*

2. *Item:*

CHANGES IN CONTRACT PRICE AND CONTRACT TIMES:

We propose that the Contract Price and Contract Times be changed as follows:

For Contract Price, attach detailed cost breakdowns for Contractor and Subcontractors, Supplier quotations, and other information required.

For the Contract Times, state increase, decrease, or no change to Contract Times for Substantial Completion, readiness for final payment, and Milestones, if any. If increase or decrease, state specific number of days for changes to the Contract Times.

Description	Amount	Contract Times (days)	
		Substantial	Final
1. Item	\$0.00	0	0
2. Item	\$0.00	0	0
Total This Change Proposal	\$0.00	0	0

Changes to Milestones, if any: _____

Contractor represents that supporting data attached to this Change Proposal are accurate and complete. The requested time or price adjustment indicated in this Change Proposal is the entire adjustment to which Contractor believes it is entitled as a result of the proposed change(s) indicated herein.

Change Proposal by: _____

Signature of Proposer: _____

SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall prepare and submit to ENGINEER for acceptance a Schedule of Values that allocates cost to each item of the Work. Schedule of Value list of line items shall correspond to each aspect of the Work, establishing in detail the portion of the Contract Price allocated to each major component of the Work.
2. Upon request of ENGINEER, support values with data that substantiate their correctness.
3. Submit preliminary Schedule of Values to ENGINEER for initial review. CONTRACTOR shall incorporate ENGINEER's comments into the Schedule of Values and resubmit to ENGINEER. ENGINEER may require corrections and re-submittals until Schedule of Values is acceptable.
4. Schedule of Values may be used as a basis for negotiating price of changes, if any, in the Work.
5. Schedule of Values and the Progress Schedule updates specified in Section 01 32 16, Progress Schedule, will be basis for preparing each Application for Payment.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Submit to ENGINEER Schedule of Values in the form and quantity required in Section 01 33 00, Submittal Procedures, and in accordance with Section 01 31 26, Electronic Communication Protocols.
2. Content of Schedule of Values submittals shall be in accordance with Article 1.3 of this Section.
3. Timing of Submittals:
 - a. Submit preliminary Schedule of Values within time limit indicated in the General Conditions.
 - b. Submittal of the Schedule of Values for acceptance by ENGINEER shall be in accordance with the General Conditions. ENGINEER will not accept Applications for Payment without an acceptable Schedule of Values.
 - c. When required by ENGINEER, promptly submit updated Schedule of Values to include cost breakdowns for changes in the Contract Price.

1.3 SCHEDULE OF VALUES FORMAT AND CONTENT

- A. Organization and Major Elements of Schedule of Values
1. Prepare Schedule of Values on the “progress estimate” or “continuation sheets”, as applicable, of the Application for Payment form indicated in Section 01 29 76, Progress Payment Procedures.
 2. Include in Schedule of Values itemized list of Work for each major work area included in the Work, for each payment item specified in Section 01 22 13, Measurement and Payment.
 3. Organization in Accordance with Specification Sections:
 - a. Within each work area, organize the Schedule of Values by the various Specifications Section numbers and titles included in the Contract Documents.
 - b. Label each row in the Schedule of Values with the appropriate Specifications Section number. Include an amount for each row in the Schedule of Values.
 - c. List sub-items of major products or systems, as appropriate or when requested by ENGINEER.
 4. Include in Schedule of Values unit price payment items with their associated quantity. Provide in the Schedule of Values detailed breakdown of unit prices when required by ENGINEER.
- B. Requirements for preliminary Schedule of Values and Schedule of Values are:
1. Subcontracted Work:
 - a. Schedule of Values shall show division of Work between CONTRACTOR and Subcontractors.
 - b. Line items for Work to be done by Subcontractor shall include the word, “(SUBCONTRACTED)”.
 2. Apportionment between Materials and Equipment, and Installation:
 - a. Schedule of Values shall include breakdown of costs for materials and equipment, installation, and other costs used in preparing the Bid by CONTRACTOR and each Subcontractor.
 - b. List purchase and delivery costs for materials and equipment for which CONTRACTOR may apply for payment as stored materials.
 3. Sum of individual values shown on the Schedule of Values shall equal the total of associated payment item. Sum of payment item totals in the Schedule of Values shall equal the Contract Price.
 4. Overhead and Profit: Include in each line item a directly proportional amount of CONTRACTOR’s overhead and profit. Do not include overhead and profit as separate item(s).
 5. Include separate line item for each allowance, and for each unit price item.
 6. Bonds and Insurance Costs: Include line item for bonds and insurance in amount not exceeding 2.0 percent of the Contract Price. This amount may be applied for in the first Application for Payment.
 7. Include relevant items for the General Conditions, permits (when applicable), construction Progress Schedule, and other items required by ENGINEER. Include such items in Applications for Payment on payment schedule acceptable to ENGINEER

8. Line items for Site maintenance such as dust control, snow removal, compliance with storm water pollution prevention plans and permits, spill prevention control and countermeasures plans, and for construction photographic documentation; temporary utilities and temporary facilities, field offices, temporary controls, field engineering, and similar Work shall be included in the Schedule of Values and proportioned in Applications for Payment throughout duration of the Work.
9. Mobilization and Demobilization:
 - a. Include separate line items under each appropriate payment item for mobilization and demobilization. Document for ENGINEER the activities included in mobilization and demobilization line items.
 - b. Mobilization will be limited to 2.0 percent of the Contract Price, and will be paid in two payments, each of 50 percent of total amount for mobilization.
 - c. Demobilization shall be not less than 1.0 percent of the Contract Price and shall be included with the Application for Payment following Substantial Completion, or other schedule acceptable to ENGINEER.
10. Costs for Shop Drawings, Samples, and other submittals; operations and maintenance manuals; field testing; and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by ENGINEER:
 - a. Up to eight percent of cost (including all associated overhead and profit) of each equipment item, exclusive of transportation and installation costs associated with that item, may be allocated to preparation of Shop Drawings, Samples, and other submittals and may be included in the Application for Payment following ENGINEER's approval of Shop Drawings (and acceptance of other submittals, as applicable) required for fabricating or purchasing for that item for the Work.
 - b. Up to three percent of total cost of each item (including all associated overhead and profit), including materials and equipment, and installation, may be apportioned to testing and included in the Application for Payment following ENGINEER's acceptance of the associated written field testing report(s).
 - c. Up to a total of four percent of equipment cost (including all associated overhead and profit), exclusive of transportation and installation costs, may be apportioned to operations and maintenance manuals and training of operations and maintenance personnel, which may be included in the Application for Payment following completion of training for that item.
11. Project Record Documents:
 - a. Include in the Schedule of Values a line item with appropriate value for Project record documents.
 - b. If adequate record documents are maintained, up to 50 percent of the value of the record documents line item will be eligible for payment, spread evenly over those progress payments in which construction at the Site is performed.
 - c. Remainder of Project record documents line item will be eligible for payment when complete record documents are submitted in accordance with the Contract Documents. If record documents submitted are

unsatisfactory to ENGINEER, amount may be reduced via set-offs in accordance with the Contract Documents.

12. Schedule of Values shall include an itemized list of Work by work area, as applicable, for Work included in Section 01 14 16, Coordination with Owner's Operations.
13. Coordinate Schedule of Values with cost-loading of the Progress Schedule, in accordance with Section 01 32 16, Progress Schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 29 76

PROGRESS PAYMENT PROCEDURES

PART 1 – GENERAL

1.1 PROGRESS PAYMENTS

A. Scope:

1. CONTRACTOR's requests for payment shall be in accordance with the Agreement, General Conditions and Supplementary Conditions, and the Specifications.
2. Form: Applications for Payment shall be in the form of Engineers Joint Contract Documents Committee (EJCDC) document EJCDC® C-620, "Contractor's Application for Payment", 2013 edition or later.

B. Procedure:

1. Review with Resident Project Representative (RPR) quantities and the Work proposed for inclusion in each progress payment. Application for Payment shall cover only the Work and quantities recommended by the RPR.
2. CONTRACTOR will be required to review with ENGINEER or RPR the status of record documents in connection with ENGINEER's review of each Application for Payment. Failure to maintain record document current will be just cause for ENGINEER to recommend a reduction in payment for record documents in accordance with Section 01 29 73, Schedule of Values, and will entitle OWNER to set-offs in accordance with the Contract Documents.
3. Submit to ENGINEER three printed originals, each with CONTRACTOR's original, "wet" signature, of each complete Application for Payment and other documents to accompany the Application for Payment.
4. ENGINEER will act on request for payment in accordance with the General Conditions and Supplementary Conditions.

C. Each request for progress payment shall include:

1. Completed Application for Payment form, including summary/signature page, progress estimate sheets, and stored materials summary. Progress estimate sheets shall have the same level of detail as the Schedule of Values.
2. Documentation for Stored Materials and Equipment:
 - a. For materials and equipment not incorporated in the Work but suitably stored, submit documentation in accordance with the General Conditions and Supplementary Conditions.
 - b. UCC-1 Financial Statement:
 - 1) For each lot or delivery of stored materials and equipment for which payment is requested prior to installation of the item(s) at the Site, complete UCC-1, "Financial Statement" form. On UCC-1 form, indicate OWNER as "security party"; indicate Supplier as "debtor" when stored item(s) are in Supplier's custody, and indicate

- CONTRACTOR as “debtor” when stored item(s) are in CONTRACTOR’s custody; and clearly indicate in detail all stored item(s) included in the filing as “collateral” on the form. Include attachments to the form when necessary to clearly and fully indicate in detail the associated “collateral”.
- 2) File completed UCC-1 form with the secretary of state in the state where the subject item(s) are stored.
 - 3) Include with Application for Payment the completed UCC-1 form together with evidence of filing with the required state(s). Submit UCC-1 form and related documentation once for each lot or delivery of stored items.
- c. Photographs of the stored items at the storage location, in accordance with requirements for progress photographs in Section 01 32 33, Photographic Documentation. Submit photographs sufficient to clearly indicate each stored item, clearly showing marking of OWNER’s property in accordance with Paragraph 1.2.C.1 of this section. Such photographs do not count as photographs required under Section 01 32 33, Photographic Documentation. For each month that such item(s) are stored, take and submit monthly new photographs of each stored item.
 - d. Legibly indicate on invoice or bill of sale the specific stored materials or equipment included in the payment request and corresponding bid/payment item number for each and the Supplier price for each item.
3. For Payment on the Basis of Cost of the Work Plus a Fee.
 - a. When Work included in an Application for Payment will be compensated on the basis of Cost of the Work plus a fee, whether when the entire Contract is compensated on the basis of Cost of the Work plus a fee or when the Application for Payment includes Change Order Work to be compensated on the basis of Cost of the Work plus a fee, the Application for Payment shall include documentation of the costs, including not less than the following:
 - 1) Number and labor classifications of workers employed and hours worked.
 - 2) Construction equipment used including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used for the Work compensated on the basis of Cost of the Work.
 - 3) Consumables and similar materials used.
 - 4) Receipts, bills, or invoices for and descriptions of materials and equipment incorporated into the Work.
 - 5) Invoices and labor and equipment breakdowns for Subcontractors, and Suppliers’ onsite time, if any.
 - 6) Invoices for other expenses included in the Application for Payment, such as travel and subsistence expenses, costs for bonds and insurance, and all other costs and expenses for which compensation is sought in the subject Application for Payment on the basis of Cost of the Work.
 - 7) Other information required by OWNER or ENGINEER,

- b. Costs for which progress payment is requested on the basis of Cost of the Work plus a fee and for which documentation acceptable to ENGINEER is not submitted will not be eligible for payment.
- 4. Listing of Subcontractors and Suppliers:
 - a. In accordance with the General Conditions, submit not less than monthly updated listing of all Subcontractors and Suppliers known to CONTRACTOR, whether or not such entities have a contract directly with CONTRACTOR.
 - b. Submit complete information using the form attached to this Section.
- 5. Allowance Work:
 - a. For payment requests that include payment for Work under an allowance, include with the progress payment request copy of OWNER's authorization of the associated allowance Work, in accordance with Section 01 21 00, Allowances.
- 6. Partial Release or Reduction of Retainage:
 - a. For each Application for Payment where CONTRACTOR requests partial release or reduction of retainage in any amount (other than request for final payment), submit with associated progress payment request consent of surety to partial release or reduction of retainage, duly completed by CONTRACTOR and surety.
 - b. Acceptable form includes AIA® G707A™, "Consent of Surety to Reduction in or Partial Release of Retainage", 1994 or later edition, or other form acceptable to OWNER.
 - c. For payment requests that include reduction in or payment of retainage in an amount greater than that required by the Contract Documents, obtain OWNER's concurrence for partial release or reduction in retainage prior to submitting such Application for Payment.

D. Final Payment:

- 1. Requirements for request for final payment are in the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 77 19, Closeout Requirements.

1.2 PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Observation of Stored Materials and Equipment Prior to Application for Payment:

- 1. General:
 - a. Prior to materials or equipment suitably stored but not yet incorporated into the Work can be eligible for payment, ENGINEER or Resident Project Representative (RPR) shall visit the storage location and verify the extent, condition, and storage environment of the stored items.
 - b. When the same material or equipment item is stored for more than two months, such visits to storage location shall be not less than once every two months.
- 2. Cost Responsibility for Observations:
 - a. When storage location is less than 20 miles from the Site or less than 20 miles from ENGINEER's office, CONTRACTOR is not responsible for

- reimbursing OWNER for cost of ENGINEER's time and expenses for observing stored materials and equipment.
- b. When storage location is more than 20 miles from the Site and more than 20 miles from ENGINEER's office, CONTRACTOR shall reimburse OWNER, via a set-off under the Contract Documents, for cost of ENGINEER's time and expenses, including travel time, to visit the storage location and observe the stored materials and equipment.
3. When materials or equipment are stored in a bonded warehouse, CONTRACTOR may submit affidavit of delivery to the warehouse (affidavit signed by warehouse operator and CONTRACTOR) in lieu of ENGINEER's or RPR's first visit to the storage location. Affidavit shall specifically indicate the following relative to the stored items:
 - a. Extent and quantity of stored items.
 - b. Condition of stored items and packaging (if items are stored in wrap or crates).
 - c. Conditions of storage environment.
- B. Other Requirements for Stored Items: Regardless of storage location, perform the following for stored materials and equipment for which payment is sought:
1. Clearly mark each stored container, crate, or item as follows: "Property of Town of Clarkstown" using permanent marking. Such marking shall not blemish or deface the finish of items that will be exposed to view after installation at the Site.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below, following this Section's "End of Section" designation, are part of this Specification Section:
1. List of Subcontractors and Suppliers form (two pages).

+ + END OF SECTION + +

LIST OF SUBCONTRACTORS AND SUPPLIERS

Owner: _____

Project Name: _____

Contractor: _____ Date: _____

Contract Designation: _____

Indicate below complete information for each Subcontractor and Supplier known to Contractor, regardless of whether the firm has a direct contract with Contractor. Include all lower-tier Subcontractors and associated Suppliers. Copy and paste the paragraphs below as required to indicate all Subcontractors and Suppliers.

SUBCONTRACTORS

1. Subcontractor Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Work Under Specifications Section Nos.:*
- *Brief Description of Work:*
- *Current Subcontract Price:*
- *Approximate Subcontract Start Date:*
- *Approximate Subcontract End Date:*

2. Subcontractor Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Work Under Specifications Section Nos.:*
- *Brief Description of Work:*
- *Current Subcontract Price:*
- *Approximate Subcontract Start Date:*
- *Approximate Subcontract End Date:*

3. Subcontractor Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Work Under Specifications Section Nos.:*
- *Brief Description of Work:*
- *Current Subcontract Price:*
- *Approximate Subcontract Start Date:*
- *Approximate Subcontract End Date:*

Total of Subcontract Prices for all subcontracts equals approximately ____ percent of the Contract Price (*Contractor to fill in blank monthly*)

SUPPLIERS

1. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

2. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

3. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

SECTION 01 31 16

MULTIPLE CONTRACT COORDINATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Prime Contractors:
 - a. Prime CONTRACTORS shall coordinate their work and cooperate among themselves, assisted by the construction coordinator identified in the Supplementary Conditions, as required for satisfactory, expeditious completion of the Project (i) within the Contract Times, (ii) in accordance with the Progress Schedule, and (iii) in accordance with the Contract Documents.
 - b. Prime contracts for the Project are indicated in Section 01 12 13, Summary of Work.
 - c. Additional requirements regarding coordination among prime contractors are in the General Conditions and elsewhere in the Contract Documents
2. Subcontractors and Suppliers:
 - a. Prime CONTRACTORS shall coordinate and cooperate fully with their own Subcontractors and Suppliers and others whose services, materials, or equipment, are required to complete their Work in accordance with the Contract Documents.
 - b. Additional requirements regarding prime CONTRACTORS' responsibility for coordinating and scheduling their Subcontractors and Suppliers are in the General Conditions and elsewhere in the Contract Documents.
3. Work by Others:
 - a. In accordance with the General Conditions as may be modified by the Supplementary Conditions, prime CONTRACTORS, assisted by the construction coordinator identified in the Supplementary Conditions, shall cooperate with, and coordinate their Work with, contractors on OWNER's other projects, utility owners and utility service companies, OWNER's and facility manager's employees working at the Site, and other entities working at the Site, in accordance with Section 01 12 13, Summary of Work.

B. Coordination:

1. Each prime CONTRACTOR shall review the Progress Schedule and installation procedures under other Specifications Sections and other prime contracts that may affect their Work, and coordinate installation of such work with appropriate entity or entities.
2. General CONTRACTOR shall provide openings in concrete formwork and in other construction as required to accommodate the Work under other

Specifications Sections and the work of other contractors, assist other contractors in installing “built-in” items required for other contractors’ work, and protect such “built-in” items and other work of other contractors from damage.

3. Prime CONTRACTORS shall notify construction coordinator and ENGINEER in writing if prime CONTRACTOR believes that another contractor is failing to coordinate its work with work of other contractors. Construction coordinator will promptly investigate the charge and, after consultation with construction coordinator, ENGINEER will issue such clarifications and interpretations to other contractor(s) as the situation requires.
4. Should a prime CONTRACTOR suffer loss, damages, delay, or require other relief with respect to the terms of the Contract Documents because of the actions or inactions of another contractor working for OWNER at the Site, said prime CONTRACTOR shall prepare and transmit a Change Proposal in accordance with the Contract Documents. OWNER may in turn file a Claim against the infringing contractor, in accordance with the Contract Documents.
5. OWNER does not guarantee continuous efficiency of prime contractors.

C. Layout and Coordination Drawings:

1. Prime CONTRACTORS shall maintain at the Site sufficient competent personnel for preparing layout drawings and coordination drawings. Where such drawings are to be prepared by Subcontractors, the Subcontractor shall have required personnel at the Site.
2. Each prime CONTRACTOR shall provide CONTRACTOR’s own drafting equipment, computer hardware, systems, software, and supplies.
3. Prime CONTRACTORS shall share coordination drawings among themselves.
4. Promptly furnish coordination drawings to the construction coordinator when requested.

1.2 QUALITY ASSURANCE

A. Coordination Meetings:

1. Coordination meetings shall be held on a weekly basis, unless mutually agreed by the prime CONTRACTORS, construction coordinator, and other interested or involved entities that another schedule is suitable.
2. Site Mobilization Meeting:
 - a. Initial meeting will be the Site mobilization meeting (unless such meeting is held as part of the preconstruction conference) and will be held within ten days after the Contract Times commence running.
 - b. At the Site mobilization meeting, prime CONTRACTORS, OWNER, and construction coordinator, with advice of ENGINEER when such decisions have potential to affect the completed Project, will make decisions on allocations of space at the Site, construction plant requirements, and future coordination meetings.
 - c. A preliminary agenda of topics to be covered at the Site mobilization meeting is indicated in Section 01 31 19.13, Preconstruction Conference.

- d. Construction coordinator or ENGINEER will advise each prime CONTRACTOR of the time, place, and tentative agenda for the Site mobilization meeting.
- 3. Coordination Meetings during the Project:
 - a. Purposes of coordination meetings include:
 - 1) Establishing and modifying work schedules and achieving agreement on orderly sequences of operations acceptable to all prime contractors.
 - 2) Reviewing and adjusting conflicts, work arrangements, and schedules to reduce the potential for and avoid delays and work stoppages.
 - 3) Discussing and accepting coordination drawings prepared by each prime CONTRACTOR, as required to assist and guide others.
 - b. Construction coordinator will advise each prime CONTRACTOR of the time, place, and tentative agenda of coordination meetings.
- 4. General (applicable to all meetings required under this Section):
 - a. Scheduling:
 - 1) Meetings required under this Section will be arranged through construction coordinator and shall be separate from and in addition to progress meetings.
 - 2) If a prime CONTRACTOR cannot, for compelling reasons, attend a coordination meeting, prime CONTRACTOR shall advise construction coordinator, other prime contractors, and ENGINEER in writing in a timely manner, so that meeting may be rescheduled.
 - 3) Any prime CONTRACTOR may initiate a coordination meeting by addressing request to construction coordinator.
 - b. Records of Meetings:
 - 1) Construction coordinator will keep notes, records, and write minutes of meetings required under this Section, and distribute to meeting attendees and others as appropriate, including OWNER, ENGINEER, and Resident Project Representative (RPR).
 - c. Attendees:
 - 1) Each prime CONTRACTOR shall have a representative present at each meeting required under this Section.
 - 2) Construction coordinator shall attend each meeting required under this Section.
 - 3) OWNER, ENGINEER, and RPR may attend coordination meetings, but their attendance is not mandatory.
 - d. Representatives:
 - 1) Representatives of prime CONTRACTORS at meetings required under this Section shall have competence and authority to make necessary decisions.
 - 2) Representatives' decisions and statements shall commit the associated prime CONTRACTOR to the agreed procedures, sequence of operations, and schedules.
 - e. Failure to be represented at one or more meetings required under this Section will cause absent prime CONTRACTOR(s) to be liable for damages, delays, costs of alterations, and other costs that result because

CONTRACTOR was not present to arrange coordination of their Work with other construction activities.

- f. Where procedures have been agreed upon and coordination drawings accepted by construction coordinator and prime CONTRACTORS concerned, coordination drawings and procedures shall become binding on prime CONTRACTORS concerned relative to time and performance. Such drawings do not, however, take precedence over the Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 31 19.13

PRE-CONSTRUCTION CONFERENCE

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. A pre-construction conference will be held for the Project.
 - 2. CONTRACTOR shall attend the conference prepared to discuss all items on the pre-construction conference agenda.
 - 3. ENGINEER will distribute an agenda, preside at conference, and prepare and distribute minutes to all conference participants and others as requested.
- B. Purpose of Pre-construction Conference:
 - 1. Purpose of conference is to designate responsible personnel, establish working relationships, discuss preliminary schedules submitted by CONTRACTOR, and review administrative and procedural requirements for the Project.
 - 2. Matters requiring coordination will be discussed and procedures for handling such matters will be established.
 - 3. Unless otherwise indicated in the Contract Documents or otherwise agreed to by the entities involved, Site mobilization meeting will be part of the pre-construction conference.

1.2 PREPARATION FOR PRE-CONSTRUCTION CONFERENCE

- A. Date, Time, and Location:
 - 1. Conference will be held after execution of the Contract and before Work starts at the Site.
 - 2. ENGINEER will establish the date, time, and location (or virtual meeting) of conference and notify the interested and involved entities.
- B. Submittals Required Prior to Pre-construction Conference:
 - 1. Not less than three days prior to pre-construction conference, submit the following preliminary schedules in accordance with the General Conditions and other requirements of the Contract Documents:
 - a. Preliminary Progress Schedule information by each prime contractor.
 - b. Preliminary Schedule of Submittals.
 - c. Preliminary Schedule of Values.
 - d. Listing of identity and general scope of Work or supply (as applicable) of planned Subcontractors and Suppliers. Indicate extent of each Subcontract proposed and overall percentage of Contract Price to be subcontracted.

- C. CONTRACTOR shall furnish information required and contribute appropriate items for discussion at the pre-construction conference.
- D. Handouts for Pre-Construction Conference:
 - 1. CONTRACTOR shall bring to the conference the following, with sufficient number of copies for each attendee:
 - a. Preliminary progress scheduling information, as submitted to ENGINEER.
 - b. Preliminary Schedule of Submittals, as submitted to ENGINEER.
 - c. Preliminary Schedule of Values, as submitted to ENGINEER.
 - d. Listing of identity and general scope of Work or supply of planned Subcontractors and Suppliers.
 - e. List of emergency contact information, in accordance with Article 1.5 of Section 01 35 23, Safety Requirements.

1.3 REQUIRED ATTENDEES

- A. Representative of each entity attending the conference shall be authorized to act on that entity's behalf.
- B. Contractor Attendance: Conference shall be attended by CONTRACTOR's:
 - 1. Project manager.
 - 2. Site superintendent
 - 3. Project managers for major Subcontractors, and major equipment Suppliers as CONTRACTOR deems appropriate.
- C. Other attendees will be representatives of:
 - 1. OWNER.
 - 2. ENGINEER.
 - 3. Resident Project Representative (RPR), if available.
 - 4. Construction coordinator.
 - 5. Authorities having jurisdiction over the Work, if available.
 - 6. Utility owners, as applicable.
 - 7. Others as requested by OWNER, CONTRACTOR, or ENGINEER.

1.4 AGENDA

- A. Preliminary Agenda: Be prepared to discuss in detail the topics indicated below. Revisions, if any, to the agenda below will be furnished to required attendees prior to the pre-construction conference.
 - 1. Procedural and Administrative:
 - a. Personnel and Teams:
 - 1) Designation of roles and personnel.
 - 2) Limitations of authority of personnel, including personnel who will sign Contract modifications and make binding decisions.
 - 3) Subcontractors and Suppliers in attendance.
 - 4) Authorities having jurisdiction.

- b. Procedures for communications and correspondence, including electronic communication protocols.
- c. Copies of the Contract Documents and availability.
- d. Subcontractors and Suppliers.
 - 1) Lists of proposed Subcontractors and Suppliers.
- e. The Work and Scheduling:
 - 1) General scope of the Work.
 - 2) Contract Times, including Milestones (if any).
 - 3) Phasing and sequencing.
 - 4) Preliminary Progress Schedule.
 - 5) Critical path activities.
- f. Safety:
 - 1) Responsibility for safety.
 - 2) Contractor's safety representative.
 - 3) Emergency procedures and accident reporting.
 - 4) Emergency contact information.
 - 5) Confined space entry permits.
 - 6) Hazardous materials communication program.
 - 7) Impact of Project on public safety.
- g. Permits.
- h. Review of insurance requirements and insurance claims.
- i. Coordination:
 - 1) Project coordination, and coordination among contractors.
 - 2) Construction coordinator.
 - 3) Coordination with Owner's operations.
 - 4) Progress meetings.
 - 1) Preliminary Schedule of Submittals.
 - 2) Procedures for furnishing and processing submittals.
 - 3) Work not eligible for payment until submittals are approved or accepted (as required).
 - 4) Construction photographic documentation.
- j. Submittals:
 - 1) Preliminary Schedule of Submittals.
 - 2) Submittal procedures.
 - 3) Contractor coordination and approval stamp.
 - 4) Meaning of Engineer's actions/submittal disposition.
 - 5) Preliminary discussion of initial, critical submittals.
 - 6) Construction photographic documentation.
- k. Substitutes and "Or-Equals":
 - 1) Product options.
 - 2) Procedures for proposing "or-equals".
 - 3) Procedures for proposing substitutes.
- l. Contract Modification Procedures
 - 1) Requests for interpretation
 - 2) Written clarifications
 - 3) Field Orders
 - 4) Proposal Requests

- 5) Change Proposals
- 6) Work Change Directives.
- 7) Change Orders.
- 8) Procedure for Claims and dispute resolution
- m. Payment:
 - 1) Owner's Project financing and funding, as applicable.
 - 2) Owner's tax-exempt status.
 - 3) Preliminary Schedule of Values
 - 4) Procedures for measuring for payment.
 - 5) Retainage.
 - 6) Progress payment procedures.
 - 7) Prevailing wage rates and payrolls.
- n. Testing and inspections, including notification requirements.
- o. Disposal of demolition materials.
- p. Record documents.
- q. Preliminary Discussion of Contract Closeout:
 - 1) Procedures for Substantial Completion.
 - 2) Contract closeout requirements.
 - 3) Correction period.
 - 4) Duration of bonds and insurance.
- 2. Site Mobilization (if not covered in a separate meeting):
 - a. Working hours and overtime.
 - b. Field offices, storage trailers, and staging areas.
 - c. Temporary facilities.
 - d. Temporary utilities and limitations on utility consumption (where applicable).
 - e. Utility company coordination (if not done as a separate meeting).
 - f. Access to Site, access roads, and parking for construction vehicles.
 - g. Maintenance and protection of traffic.
 - h. Use of Site and premises.
 - i. Protection of property.
 - j. Security.
 - k. Temporary controls, such as sediment and erosion controls, noise controls, dust control, storm water controls, and other such measures.
 - l. Site barriers and temporary fencing.
 - m. Storage of materials and equipment.
 - n.. Reference points and benchmarks; surveys and layouts.
 - o. Site maintenance during the Project.
 - p. Cleaning and removal of trash and debris.
 - q. Restoration.
- 3. General discussion and questions.
- 4. Next meeting.
- 5. Site visit, if required.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 31 19.23

PROGRESS MEETINGS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. Progress meetings will be held throughout the Project. CONTRACTOR shall attend each progress meeting prepared to discuss in detail all items on the agenda.
 - 2. ENGINEER will preside at progress meetings and will prepare and distribute minutes of progress meetings to all meeting participants and others as requested.

1.2 PREPARATION FOR PROGRESS MEETINGS

- A. Date and Time:
 - 1. Regular Meetings: Every two weeks on a day and time agreeable to OWNER, ENGINEER, and CONTRACTOR.
 - 2. Other Meetings: As required.
- B. Location:
 - 1. Virtual Meeting and at Highway Garage Office.
- C. Handouts:
 - 1. CONTRACTOR prepare for each progress meeting the following:
 - a. List of Work accomplished since the previous progress meeting.
 - b. Up-to-date Progress Schedule.
 - c. Up-to-date Schedule of Submittals.
 - d. Detailed “look-ahead” schedule of Work planned through the next progress meeting, with specific starting and ending dates for each activity, including shutdowns, deliveries of important materials and equipment, Milestones (if any), and important activities affecting the OWNER, Project, and Site.
 - e. When applicable, list of upcoming, planned time off (with dates) for personnel with significant roles on the Project, and the designated contact person in their absence.

1.3 REQUIRED ATTENDANCE

- A. Representatives present for each entity shall be authorized to act on that entity’s behalf.
- B. Required Attendees:

1. CONTRACTOR:
 - a. Project manager.
 - b. Site superintendent.
 - c. Safety representative.
 - d. When needed for the discussion of a particular agenda item, representatives of Subcontractors and Suppliers shall attend meetings.
2. Construction coordinator (if any).
3. ENGINEER:
 - a. Project manager or designated representative
 - b. Resident Project Representative (if any).
 - c. Others as required by ENGINEER.
4. OWNER's representative(s), as required.
5. Testing and inspection entities, as required.
6. Others, as appropriate.

1.4 AGENDA

- A. Preliminary Agenda: Be prepared to discuss in detail the topics listed below. Revised agenda, if any, will be furnished to CONTRACTOR prior to first progress meeting. Progress meeting agenda may be modified by ENGINEER during the Project as required.
 1. Review, comment, and amendment (if required) of minutes of previous progress meeting.
 2. Review of progress since the previous progress meeting.
 3. Planned progress through next progress meeting.
 4. Review of Progress Schedule
 - a. Contract Times, including Milestones (if any)
 - b. Critical path.
 - c. Schedules for fabrication and delivery of materials and equipment.
 - d. Corrective measures, if required.
 5. Submittals:
 - a. Review status of critical submittals.
 - b. Review revisions to Schedule of Submittals.
 6. Contract Modifications
 - a. Requests for interpretation
 - b. Written clarifications
 - c. Field Orders
 - d. Proposal Requests
 - e. Change Proposals
 - f. Work Change Directives.
 - g. Change Orders.
 - h. Claims.
 7. Applications for progress payments.
 8. Problems, conflicts, and observations.
 9. Quality standards, testing, and inspections.
 10. Coordination between parties.

11. Site management issues, including access, security, maintenance and protection of traffic, maintenance, cleaning, and other Site issues.
12. Safety.
13. Permits.
14. Construction photographic documentation.
15. Record documents status.
16. Punch list status, as applicable.
17. Other business.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 31 26

ELECTRONIC DOCUMENT PROTOCOL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section establishes the procedures with which the parties will comply regarding transmission or exchange of electronic data for the Project.
2. Contractor shall provide labor, materials, tools, equipment, services, utilities, and incidentals shown, specified, and required for complying with this Section throughout the Project.
3. This Section does not supersede the General Conditions, as may be modified by the Supplementary Conditions, regarding transmitting of the Contract Documents to Contractor after the Effective Date of the Contract.
4. In addition to the requirements of this Section, comply with requirements for exchange of electronic data in the following:
 - a. Section 01 32 16, Progress Schedule.
 - b. Section 01 32 33, Photographic Documentation.

B. Coordination:

1. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

1.2 TERMINOLOGY

- A. The term “Electronic Document” is defined in Paragraph 1.01.A.20 and the term “Electronic Means” is defined in Paragraph 1.01.A.21 of the General Conditions.
- B. The following words or terms are not defined but, when used in this Section, have the following meaning:
 1. “Confidential information” means electronic data that the transmitting party has designated as confidential and clearly marked with an indication such as “Confidential”, “Business Proprietary”, or similar designation.
 2. “Written” or “in writing” means any and all communications, including without limitation a notice, consent, or interpretation, prepared and sent to an address provided in the Contract Documents or otherwise agreed upon by the parties and Engineer using a transmission method sent forth in this Section that allows the recipient to print or store the communication. Communications transmitted electronically are presumed received when

sent in conformance with this Paragraph 1.2.A.3.

1.3 ELECTRONIC DOCUMENTS

- A. Transmission of Electronic Documents constitutes a warrant by the transmitting party to the receiving party that the transmitting party is one or more of the following:
 - 1. The copyright owner of the Electronic Document.
 - 2. Has permission from the copyright owner to transmit the Electronic Document for its use on the Project.
 - 3. Is authorized to transmit confidential information.
- B. Receiving party agrees to keep confidential information confidential and not to disclose it to another person except to (1) its employees, (2) those who need to know the content of the confidential information to perform services or construction solely and exclusively for the Project, or (3) its consultants, contractors, Subcontractors, and Suppliers whose contracts include similar restrictions on the use of any Electronic Document and confidential information.
- C. Transmitting party does not convey any right in any Electronic Document or in the software used to generate or transmit such data. Receiving party may not use electronic data unless permission to do so is provided in the Contract Documents, or in a separate license.
- D. Unless otherwise granted in a separate license, receiving party's use, modification, or further transmission of Electronics Documents, as provided the Contract Documents, is specifically limited to the design and construction of the Project in accordance with this Section, and nothing contained in this Section conveys any other right to use the Electronic Document for any other purpose.
- E. To the fullest extent permitted by Laws and Regulations, receiving party shall indemnify and defend the transmitting party from and against all claims arising from or related to receiving party's modification to, or unlicensed use of, Electronic Documents.

1.4 ELECTRONIC DOCUMENT PROTOCOL

- A. Basic Requirements
 - 1. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.
 - 2. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
 - 3. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing

requirements, limitations, and restrictions, set forth in the Contract Documents.

4. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.
- B. System Infrastructure For Electronic Document Exchange
1. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions (“System Infrastructure”) at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.
 - a. The maximum size of an email attachment for exchange of Electronic Documents under this EDP is [number] MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.
 - b. Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.
 2. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology (“IT”) for maintaining operations of its System Infrastructure during the Project, including coordination with the party’s individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.
 3. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.
 4. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original

intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

5. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.
 6. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.
 7. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.
 8. The Owner will operate a Project information management system (also referred to in this EDP as “Project Website”) for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:
 - a. Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;
 - b. Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;
 - c. Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and
 - d. Include any other Project Website attributes that may be pertinent to Contractor’s use of the facility and pricing of such use.
- C. Software Requirements For Electronic Document Exchange; Limitations

1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.
 - a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.
2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.
3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this Section, including software versions, if listed.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXHIBITS

- A. Exhibit A, Software Requirements for Electronic Document Exchange following this Section's "End of Section" designation, is part of this Specifications Section.

+ + END OF SECTION + +

Exhibit A - Software Requirements for Electronic Document Exchange

Item	Electronic Documents	Transmittal Means	Data Format	Note (1)
a.1	General communications, transmittal covers, meeting notices and responses to general information requests for which there is no specific prescribed form.	Email	Email	
a.2	Meeting agendas, meeting minutes, RFI's and responses to RFI's, and Contract forms.	Email w/ Attachment	PDF	(2)
a.3	Contractors Submittals (Shop Drawings, "or equal" requests, substitution requests, documentation accompanying Sample submittals and other submittals) to Owner and Engineer, and Owner's and Engineer's responses to Contractor's Submittals, Shop Drawings, correspondence, and Applications for Payment.	Email w/ Attachment	PDF	
a.4	Correspondence; milestone and final version Submittals of reports, layouts, Drawings, maps, calculations and spreadsheets, Specifications, Drawings and other Submittals from Contractor to Owner or Engineer and for responses from Engineer and Owner to Contractor regarding Submittals.	Email w/ Attachment or LFE	PDF	
a.5	Layouts and drawings to be submitted to Owner for future use and modification.	Email w/ Attachment or LFE	DWG	
a.6	Correspondence, reports and Specifications to be submitted to Owner for future word processing use and modification.	Email w/ Attachment or LFE	DOC	
a.7	Spreadsheets and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	EXC	
a.8	Database files and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	DB	
Notes				
(1)	All exchanges and uses of transmitted data are subject to the appropriate provisions of Contract Documents.			
(2)	Transmittal of written notices is governed by Paragraph 18.01 of the General Conditions.			
Key				
Email	Standard Email formats (.htm, .rtf, or .txt). Do not use stationery formatting or other features that impair legibility of content on screen or in printed copies			
LFE	Agreed upon Large File Exchange method (FTP, CD, DVD, hard drive)			
PDF	Portable Document Format readable by Adobe® Acrobat Reader			
DWG	Autodesk® AutoCAD .dwg format			
DOC	Microsoft® Word .docx format			
EXC	Microsoft® Excel .xls or .xml format			
DB	Microsoft® Access .mdb format			

SECTION 01 32 16.00.30

PROGRESS SCHEDULE

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. General CONTRACTOR shall prepare and submit Progress Schedules and related documents in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section, unless otherwise accepted by ENGINEER.
2. Prime contractors engaged on the Project, other than the General CONTRACTOR, shall promptly furnish information to General CONTRACTOR and ENGINEER, as indicated, for preparing and updating Progress Schedules and related documents.
3. Maintain and update Progress Schedules and related documents.
4. Progress Schedule shall be resource- and cost-loaded CPM Progress Schedule.
5. ENGINEER's acceptance of the Progress Schedule or related documents, and comments or opinions concerning activities in the Progress Schedule and related documents shall not control independent judgment of CONTRACTOR concerning means, methods, techniques, sequences and procedures of construction, unless the associated means, method, technique, sequence, or procedure is directed by the Contract Documents. CONTRACTOR is solely responsible for complying with the Contract Times.

B. Use of Float:

1. Float belongs to the Project and may be used by OWNER or any CONTRACTOR to accommodate changes in the Work, or to mitigate the effect of events that delay performance or compliance with the Contract Times.
2. Changes or delays that influence Activities that have Float and that do not extend the Critical Path are not justification for an extension of the Contract Times.

C. Factors Affecting the Progress Schedule:

1. In preparing and maintaining the Progress Schedule, take into consideration submittal requirements and submittal review times, coordination of submittals among contractors, time for fabricating and delivering materials and equipment, source quality control (including shop testing) and field quality control (including testing at the Site), Subcontractors' work, availability and abilities of workers, availability of construction equipment, weather conditions, restrictions in operations at the Site and coordination with OWNER's operations, and other factors that have the potential to affect completion of the Work within the Contract Times.
2. Comply with sequencing requirements indicated in the following:

- a. Section 01 12 13, Summary of Work.
- b. Section 01 13 13, Milestones.
- c. Section 01 14 16, Coordination with Owner's Operations.

1.2 DEFINITIONS AND TERMINOLOGY

- A. Definitions: The following terms are defined for this Section and supplement the terms defined in the General Conditions and Supplementary Conditions:
1. Activity: An element of the construction work that has the following specific characteristics: consumes time, consumes resources, has a definable start and finish, is assignable, and is measurable.
 2. Constraint: An imposed date on the Progress Schedule or an imposed time between Activities. The Contract Times are Constraints.
 3. CPM Progress Schedule: Computerized Progress Schedule in Critical Path Method (CPM) format which accounts for the entire Work, defines the interrelationships between elements of the Work, reflects the uncompleted Work, and indicates the sequence with which the Work has been completed, indicates the sequence in which uncompleted Work will be completed, and indicates the duration of each Activity.
 4. Critical Path: The continuous chain of Activities with the longest duration for completion within the Contract Times.
 5. Early Start: The earliest possible date an Activity can start according to the assigned relationships among Activities.
 6. Early Finish: The earliest date an Activity can finish according to the assigned relationships among the Activities.
 7. Late Finish: The latest date an Activity can finish without extending the Contract Times.
 8. Late Start: The latest date an Activity can start without extending the Contract Times.
 9. Float: The time difference between the calculated duration of the Activity chain and the Critical Path.
 10. Total Float: The total number of days that an Activity (or chain of Activities) can be delayed without affecting the Contract Times.
 11. Network Diagram: A time-scaled logic diagram depicting the durations and relationships of the Activities.
 12. Work Areas, Area, or System: A logical breakdown of the Project elements or a group of Activities which, when collectively assembled, are readily identifiable on the Project (for example: yard piping, a structure or building, a treatment process, or other logical grouping).
- B. Terminology: The following words or terms are not defined but, when used in this Section, have the following meaning:
1. "Prime contractor" is an individual or entity with whom OWNER has entered into a contract to perform part of the Project.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Progress Schedule Preparer:

- a. General CONTRACTOR shall retain services of a scheduling consultant or shall self-prepare and maintain the Progress Schedule using qualified employee with experience in scheduling, and experience with the scheduling software required for the Project, and experience serving as Progress Schedule preparer on construction projects of similar type, size, and scope to the Project, and shall be experienced on projects with multiple prime contracts.
- b. Progress Schedule preparer shall have not less than five years experience using the scheduling software required on construction projects of similar type, size, and scope as the Project.
- c. Prior to engaging a scheduling consultant or using a qualified employee, submit to ENGINEER the following:
 - 1) Name and address of proposed Progress Schedule preparer and the names of personnel who will be assigned to scheduling the Project.
 - 2) Information sufficient to demonstrate that proposed Progress Schedule preparer and scheduling personnel to be assigned to the Project possess qualifications complying with requirements of this Section. For each person assigned, submit list of similar type, size, contract value of projects, names and contact information of engineer or architect and owner.
- d. Engineer's Review of Qualifications:
 - 1) ENGINEER will respond to General CONTRACTOR whether proposed scheduling personnel are acceptable within five days after ENGINEER's receipt of complete qualifications.
 - 2) If qualifications are not acceptable, submit qualifications of acceptable personnel within five days of receipt of ENGINEER's non-acceptance.
 - 3) ENGINEER's acceptance or non-acceptance of qualifications does not release General CONTRACTOR from its obligations under the

1.4 SUBMITTALS

A. Quantity of each submittal required and timing of submittals are indicated in this Section.

B. Informational Submittals: Submit the following:

1. Ninety-day Bar Chart:
 - a. Preliminary 90-day bar chart.
 - b. Acceptable 90-day bar chart.
2. Initial Progress Schedules:
 - a. Preliminary Progress Schedule with associated Network Diagrams, narrative report, and mathematical tabulations.
 - b. Acceptable Progress Schedule with associated Network Diagrams, narrative report, and mathematical tabulations.
 - c. Preliminary resource- and cost-loaded Progress Schedule and associated reports.

- d. Acceptable resource- and cost-loaded Progress Schedule and associated reports.
 - e. Submit each Progress Schedule submittal with letter of transmittal complying with requirements of Section 01 33 00, Submittal Procedures.
- 3. Progress Schedule Updates.
 - a. Progress Schedule updates shall comply with requirements of this Section, and shall include updated Progress Schedule, narrative report, updated Network Diagram when relationships among Activities are changed, and updated mathematical tabulations.
 - b. Submit updated Progress Schedule prior to each progress meeting. When a Progress Schedule remains unchanged from one progress meeting to the next, submit a written statement to that effect. In addition to monthly Progress Schedule submittals, also bring to progress meeting the number of printed copies of the updated Progress Schedule indicated in Section 01 31 19.23, Progress Meetings.
- 4. Look-Ahead Schedules
 - a. Furnish two-week look-ahead schedule at each progress meeting.
- 5. Time Impact Analyses: Submit in accordance with this Section.
- 6. Recovery Schedule: Submit in accordance with this Section.
- 7. Qualifications:
 - a. Submit qualifications of Progress Schedule preparer, and other personnel that will assist Progress Schedule preparer in preparing and maintaining the Progress Schedule.

1.5 INITIAL PROGRESS SCHEDULES

- A. Type and Organization of Progress Schedules:
 - 1. Prepare Progress Schedule using Oracle Primavera P6 software, unless other scheduling software is acceptable to ENGINEER.
 - 2. Sheet Size: 22x34, unless otherwise accepted by ENGINEER.
 - 3. Time Scale: Indicate first date of each work week.
 - 4. Activity Designations: Indicate title and related Specifications Section number.
 - 5. Progress Schedules shall be CPM Progress Schedules.
 - 6. Organization:
 - a. Indicate on the separate Schedule of Submittals dates for submitting and reviewing Shop Drawings, Samples, and other submittals.
 - b. Group deliveries of materials and equipment into a separate sub-schedule that is part of the Progress Schedule.
 - c. Group construction into Work Area sub-schedules (that are part of the Progress Schedule) by Activity.
 - d. Clearly indicate the Critical Path on the Progress Schedule.
 - e. Organize each Work Area sub-schedule by Specifications Section number.
- B. Ninety-day Bar Chart:
 - 1. For the first 90 days after the Contract Times commence running, the 90-day bar chart accepted by ENGINEER will serve as an initial progress schedule for

mobilization and initial Work until the preliminary Progress Schedule is submitted. Ninety-day bar chart shall include the Work under each prime contract for the Project.

2. General CONTRACTOR shall prepare 90-day bar chart using same scheduling software required for Progress Schedule, with same information required for Progress Schedule, indicated for the first 90 days after the Contract Times commence running.
3. Submit 90-day bar chart in accordance with Section 01 31 26, Electronic Communication Protocols and Section 01 33 00, Submittal Procedures. Also submit 90-day bar chart in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
4. Within five days after the Effective Date of the Contract, obtain from each other prime contractor on the Project schedule requirements for the first 90 days. General CONTRACTOR shall coordinate needs among other prime contractors on the Project and develop the 90-day bar chart.
5. Within 10 days after the Effective Date of the Contract, submit preliminary 90-day bar chart.
6. Not less than 10 days before submission of General CONTRACTOR's first Application for Payment a conference attended by each separate prime contractor on the Project, Progress Schedule preparer, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the preliminary 90-day bar chart. Following the conference, General CONTRACTOR shall have 10 days to make corrections and adjustments and to complete and resubmit the acceptable 90-day bar chart. OWNER reserves the right to not make progress payment to any prime contractor until acceptable 90-day bar chart is submitted to ENGINEER.
7. Ninety-day bar chart will be acceptable to ENGINEER if it provides an orderly progression of the Work in the first 90 days of the Project and indicates compliance with Milestones, if any, in the first 90 days of the Project. Such acceptance will not impose on ENGINEER responsibility for the 90-day bar chart or the Progress Schedule for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.
8. After 90-day bar chart is accepted by ENGINEER and prior to acceptance of the Progress Schedule by ENGINEER, CONTRACTORS may apply for progress payments for bonds and insurance, mobilization, and approved Shop Drawings and Samples (and acceptance of other submittals, as applicable) required for fabricating or purchasing materials and equipment to be incorporated into the Work.

C. Preliminary Progress Schedule:

1. Within ten days after the Contract Times commence running, each prime contractor shall meet with ENGINEER where each shall present to ENGINEER a list showing each item of material or equipment to be procured for the Work; and for each material or equipment item, necessary dates for each step in the procurement process, including those for placement of orders,

approval of submittals, receipt of approvals, and delivery. Delivery time problems or other problem anticipated, if any, shall be noted as remarks in the list. Attached to the list shall be a separate statement of other anticipated problems, if any, not associated with material or equipment procurement that may affect progress of CONTRACTOR or another prime contractor on the Project.

2. ENGINEER will transmit to General CONTRACTOR one copy of each of the aforementioned lists and statements. General CONTRACTOR shall thereupon prepare the preliminary Progress Schedule for the entire Project, including work under each prime contract. General CONTRACTOR shall submit to ENGINEER the preliminary Progress Schedule covering the entire Project, with associated Network Diagrams within (--2--) days after the Contract Times commence running.
2. Submit preliminary Progress Schedule in accordance with Section 01 31 26, Electronic Communication Protocols and Section 01 33 00, Submittal Procedures. Also submit preliminary Progress Schedule in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
3. Coordination with Other Prime Contractors:
 - a. Concurrent with submittal to ENGINEER, transmit preliminary Progress Schedule and associated reports and schedule-related documents to accompany the preliminary Progress Schedule to each other prime contractor on the Project. Transmit in accordance with Section 01 31 26, Electronic Communication Protocols and Section 01 33 00, Submittal Procedures. Also transmit preliminary Progress Schedule in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
 - b. Each other prime contractor on the Project shall submit to ENGINEER comments on the preliminary Progress Schedule and related documents within five days of receipt.
 - c. If ENGINEER does not receive comments on the preliminary Progress Schedule and related documents from any prime contractor within the number of days specified in this paragraph, ENGINEER will presume that the particular prime contractor deems the preliminary Progress Schedule and related documents acceptable relative to the work of that prime contractor.
4. ENGINEER will conduct a timely review of the preliminary Progress Schedule.
5. Preliminary Progress Schedule shall comply with the Contract Documents relative to Progress Schedules, but need not be resource- or cost-loaded.

D. Initial Acceptance of Progress Schedule:

1. Not less than ten days before submission of the first Application for Payment, a scheduling conference attended by each prime contractor on the Project, Progress Schedule preparer, ENGINEER, and others as appropriate will be held at the Site to review for acceptability to ENGINEER the preliminary

Progress Schedule and associated Network Diagram and other reports and schedule-related documents required. Following the scheduling conference, General CONTRACTOR shall have five days to make corrections and adjustments and to complete and resubmit the Progress Schedule and associated Network Diagram. OWNER reserves the right to not make progress payment to any prime contractor until acceptable Progress Schedule, Network Diagram, and other reports and schedule-related documents required are submitted to ENGINEER.

1. Not more than 75 days after the Contract Times commence running, a scheduling conference attended by each prime contractor on the Project, Progress Schedule preparer, ENGINEER, and others as appropriate will be held at the Site to review for acceptability to ENGINEER the preliminary Progress Schedule and associated Network Diagram and other reports and schedule-related documents required. Following the scheduling conference, General CONTRACTOR shall have 15 days to make corrections and adjustments and to complete and resubmit the Progress Schedule and associated Network Diagram. Other than bonds and insurance, mobilization, and approved Shop Drawings (and acceptance of other submittals, as applicable) required for fabricating or purchasing materials and equipment to be incorporated into the Work, OWNER reserves the right to not make progress payments to any prime contractor until acceptable Progress Schedule, Network Diagram, and other reports and schedule-related documents required are submitted to ENGINEER.
2. Submit acceptable Progress Schedule, together with Network Diagram, reports, and other schedule-related documents required to accompany the initial acceptable Progress Schedule, in accordance with the Submittals Article of this Section, Section 01 31 26, Electronic Communication Protocols, and Section 01 33 00, Submittal Procedures. Also submit acceptable form of Progress Schedule in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
3. The Progress Schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within the Contract Times, in accordance with the Contract Documents. Such acceptance will not impose on ENGINEER responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve any prime contractor from CONTRACTOR's full responsibility therefore.
4. Initially-accepted Progress Schedule shall be identified as the baseline Progress Schedule.

E. Resource- and Cost-Loaded Progress Schedule:

1. Not more than ten days after ENGINEER's acceptance of the Progress Schedule, each prime contractor shall meet with ENGINEER, and each shall present to ENGINEER a list with detailed information sufficient for General CONTRACTOR to create a resource- and cost-loaded Progress Schedule. Data shall be for each Activity in the Progress Schedule accepted by ENGINEER to which CONTRACTOR will commit resources to accomplish the Work.

2. ENGINEER will transmit to General CONTRACTOR one copy of each of the aforementioned data required for the resource- and cost-loaded Progress Schedule. General CONTRACTOR shall thereupon prepare and, within five days of receipt of information from ENGINEER, submit to ENGINEER resource- and cost-loaded Progress Schedule complying with resource and cost loading requirements in this Section.
 3. Submit of the preliminary and the acceptable resource- and cost-loaded Progress Schedules and associated reports to accompany the initial submittals of resource- and cost-loaded Progress Schedules in accordance with the Submittals Article of this Section, Section 01 31 26, Electronic Communication Protocols, and Section 01 33 00, Submittal Procedures. Also submit preliminary and acceptable form of resource- and cost-loaded Progress Schedules in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
 4. Resource- and cost-loaded Progress Schedules will be reviewed by ENGINEER within five days of ENGINEER's receipt, and ENGINEER's comments will be transmitted to General CONTRACTOR.
 5. Make revisions required in accordance with ENGINEER's comments and resubmit to ENGINEER within five days of General CONTRACTOR's receipt of ENGINEER's comments.
 6. Resource- and cost-loaded Progress Schedule accepted by ENGINEER shall be the basis for determining the amount of each progress payment for each prime contractor on the Project.
- F. If the Progress Schedule reflects completion date(s) different than the Contract Times, the Contract Times are not thereby voided, nullified, or affected. The Contract Times govern. Where the Progress Schedule reflects completion date(s) that are earlier than the Contract Times, ENGINEER may accept such Progress Schedule with each prime contractor to specifically understand that no Change Proposals or Claims for additional Contract Times or additions to the Contract Price shall be brought against OWNER resulting from CONTRACTOR's failure to complete the Work by the earlier date(s) indicated on the accepted Progress Schedule.

1.6 PROGRESS SCHEDULE UPDATES

A. Updates:

1. Update the Progress Schedule not less-often than once per month. If during progress of the Work events develop that necessitate changes in the initially accepted Progress Schedule (e.g., baseline Progress Schedule), identify updated Progress Schedules sequentially as "Progress Schedule Revision 1", "2", "3", and continuing in sequence as required. Number the Progress Schedule submittals in accordance with Section 01 33 00, Submittal Procedures.
2. Other prime contractors shall promptly furnish to General CONTRACTOR information necessary for Progress Schedule updates. General CONTRACTOR's Progress Schedule update shall include a narrative report in accordance with this Section. Narrative report shall include description of

current progress and status of each Area of the Project, a description of progress for the period, a description of the Critical Path, a discussion of current or potential delays, Change Orders (pending and approved since the previous Progress Schedule update), and other problems associated with maintaining the Work on schedule.

3. The update to the Progress Schedule shall be based on retained logic. Progress override logic is not allowed.
4. Required scheduling software, and schedule organization, format, and content for updated Progress Schedules are identical to that required in this Section for initial Progress Schedules.
5. Submit to ENGINEER updated Progress Schedule, together with Network Diagrams (when required), reports, and other schedule-related documents required to accompany the updated Progress Schedule, in accordance with Section 01 31 26, Electronic Communication Protocols, and Section 01 33 00, Submittal Procedures. Also submit updated Progress Schedule in its native format generated by the scheduling software, transmitted using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
6. Submit updated Network Diagrams when revisions are proposed to the logic. Indicate in the narrative report delays that have occurred since the previous updated Progress Schedule. ENGINEER will not recommend payment by OWNER of progress payments until updated Progress Schedule is received, reviewed, and accepted by ENGINEER. Payment for out-of-sequence Work is not allowed.

B. Monthly Schedule Meeting:

1. During the month, utilizing the most-recent, previous two-week look-ahead schedule, each prime contractor shall record the percent complete, start and finish dates of each scheduled Activity for which that prime contractor will allocate resources with the remaining duration for each Activity started but not completed, including Activities associated with procurement of materials and equipment and shall transmit this information to General CONTRACTOR with copy to ENGINEER using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
2. On the same day each month, not less than one week prior to a progress meeting, each prime contractor on the Project, Progress Schedule preparer, ENGINEER, and others as appropriate shall meet at the Site and tour the Work to review and update the schedule and progress information gathered by General CONTRACTOR during the month. After acceptance of each prime contractor's updated data, Progress Schedule preparer shall use this information to update the Progress Schedule.

1.7 NETWORK DIAGRAMS (PERT CHARTS)

A. Network Diagrams – General:

1. General CONTRACTOR shall prepare and submit Network Diagrams, as generated using the scheduling software suitable for printing on paper of the size indicated for Progress Schedules in this Section.
 2. Group Network Diagrams by Area and show the order and interdependence of Activities and sequence and quantities in which the Work will be accomplished.
 3. Do not use match lines on Network Diagrams. Depict interrelationships to or from Activities outside the Area shown using an Activity symbol with Activity number and description.
 4. In preparing Network Diagrams, comply with the basic concept of precedence diagramming method (PDM) network scheduling to show how start of a given Activity depends on completion of preceding Activities, and how the Activity's completion may affect the start of subsequent Activities.
 5. Level of schedule detail shall define the day-to-day Activities of the Work.
- B. Network Diagram Content:
1. Clearly indicate the Critical Path and distinguish the Critical Path from other paths on the network.
 2. Organize Network Diagrams by grouping into major Work Areas, including one for procurement of materials and equipment, and by specific Activity within each Area.
 3. Logic diagrams shall include the following:
 - a. Activity number.
 - b. Activity description.
 - c. Activity duration (in work days).
 - d. Critical Path denoted.
 - e. Float for each Activity.
 - f. Activity or System designation.
 - g. Coded Area designation.
 - h. Responsibility code (e.g., each prime contractor and their respective Subcontractors, trade, operation, Suppliers, or other entity responsible for accomplishing an Activity).
 - i. Shift number (if more than one shift per day is to be employed).
- C. Network Diagram Revisions:
1. General:
 - a. When conditions develop that require revisions to logic or durations of the Network Diagram associated with the initially accepted Progress Schedule (e.g., baseline Progress Schedule), identify updates to the Network Diagram in the same manner required in this Section for Progress Schedule updates.
 - b. Revision of the logic or durations from the baseline Progress Schedule initially accepted by ENGINEER shall be submitted to ENGINEER for acceptance.
 - d. Incorporate into the Progress Schedule revisions to logic or duration accepted by ENGINEER, and include in monthly narrative report both a description of revisions and listing of Activities affected by revisions.

- e. Changes resulting from Change Orders, Work Change Directives, Field Orders, allowance authorizations, and other additions or deletions, shall be fully incorporated into the Progress Schedule and Network Diagram on the first update after the associated Change Orders, Work Change Directive, or allowance authorization is approved by OWNER, or Field Order issued by ENGINEER, including adjustments to the Contract Price (if any).
- 2. Submit revised Network Diagrams with updated Progress Schedule submittals.

1.8 RESOURCE AND COST LOADING REPORTS

A. Resource Loading:

- 1. After ENGINEER's initial acceptance of the Progress Schedule, each prime contractor shall assign resources for personnel labor-hours, materials, and equipment to each construction Activity within each responsibility code. Each prime contractor shall submit resource-loading data to General CONTRACTOR with copy to ENGINEER using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols.
- 2. General CONTRACTOR shall submit resource schedule reports with each updated Progress Schedule.

B. Cost Loading:

- 1. Using cost data furnished by each other prime contractor, General CONTRACTOR shall assign each Activity a total dollar amount commensurate with its value relative to the associated line item in the Schedule of Values accepted by ENGINEER for each prime contract. General CONTRACTOR shall submit cost reports for the initially accepted cost-loaded Progress Schedule and each subsequent update of the Progress Schedule.
- 2. After the cost-loaded Progress Schedule is accepted by ENGINEER, each Application for Payment for each prime contract on the Project will be on the basis of earned revenue as indicated in updates of the Progress Schedule.

1.9 NARRATIVE REPORT

A. General Provisions for Narrative Reports:

- 1. Prepare and include with the preliminary Progress Schedule and each subsequent Progress Schedule submittal, written narrative report describing the schedule-related requirements of the Contract Documents and each prime contractor's plan and schedule for complying with such requirements.
- 2. Narrative report shall describe the methods of sequencing and operation, resources to be employed, time frames for the construction of each of the major Systems on the Project, and time frames for complying with the Contract Times and each prime contractor's interim schedule milestones.
- 3. Prime contractors other than General CONTRACTOR shall promptly furnish to General CONTRACTOR, with copy to ENGINEER, using the transmission method indicated in Section 01 31 26, Electronic Communication Protocols,

information requested by General CONTRACTOR to complete each narrative report.

1.10 MATHEMATICAL TABULATIONS

- A. General Provisions for Mathematical Tabulations:
 - 1. Submit a mathematical tabulation of each Network Diagram. Mathematical tabulation shall include tabulation of each Activity shown on the detailed Network Diagram.
 - 2. Submit each mathematical tabulation submittal in accordance with procedures of this Section and elsewhere in the Contract Documents governing Progress Schedules submittals.
- B. Mathematical tabulation shall include the following information for each Activity.
 - 1. Activity number.
 - 2. Activity description.
 - 3. Activity duration in work days.
 - 4. Early Start date (calendar date).
 - 5. Early Finish date (calendar date).
 - 6. Late Start date (calendar date).
 - 7. Late Finish date (calendar date).
 - 8. Float of each Activity.
 - 9. Quantities involved for each Activity with labor-hour requirements and associated cost value.
 - 10. Critical Path activities indicated.
 - 11. Calendar extending beyond the date for completion and readiness for final payment by not less than six months.
- C. Mathematical tabulation shall be computer-generated reports that shall be as a single portable document format (PDF) file, indexed with functioning bookmarks. Submit computer-generated reports as follows:
 - 1. Contract Times and scheduling milestone(s).
 - 2. Critical Path Activities by Early Start.
 - 3. Area Schedule for each System by Area, Early Start, and Total Float.
 - 4. Responsibility schedule for each System by responsibility, Early Start, and Total Float.
 - 5. Cost Reports:
 - a. Cost summary by responsibility.
 - b. Monthly projected cash flow report (tabular) with cash flow graphic, formatted for printing on paper of the size specified in this Section for Progress Schedules.
 - c. Cost summary by Area.
 - d. Detailed cost reports by Area and by Activity.
 - 6. Labor-hour Resource Reports:
 - a. Labor-hour summary by responsibility.
 - b. Monthly projected labor-hour flow report (tabular) with labor resource graphic formatted for printing on paper of the size specified in this

- Section for Progress Schedules.
- c. Labor-hour summary by Area.
 - d. Detailed labor-hour reports by Area and by Activity.

1.11 TIME IMPACT ANALYSIS

A. Time Impact Analyses – General:

1. Prepare and submit a time impact analysis when one or more of the following occurs for one or more of the prime contracts on the Project: a Change Proposal is prepared, a Work Change Directive is issued that will affect the Progress Schedule, or when delays are experienced. Time impact analysis shall illustrate the influence of each Change Order, Work Change Directive, allowance authorization, or delay, as applicable, on the Contract Times and schedule milestones.
2. Each time impact analysis shall include a sketch (fragnet) demonstrating how General CONTRACTOR and other affected prime contractors, if any, proposes to incorporate the changes in the Project or, as applicable, delays into the Progress Schedule. Fragnet shall include all logic, resource and cost changes, and additions required as result of said Change Order, Work Change Directive, allowance authorization, or delay.
3. Fragnet shall show all CPM logic revisions for the Work associated with the Change Order, Work Change Directive, allowance authorization, or delay and its relationship to other Activities in the Network Diagram.
4. Time impact analysis shall demonstrate the time impact, based on date the Change Order, Work Change Directive, or allowance authorization was given to CONTRACTOR, or as applicable the date the delay was implemented; the status of the Project at that point in time; and the Activity duration of affected Activities. Activity duration used in the time impact analysis shall be those included in the latest update of the Progress Schedule accepted by ENGINEER, closest to the time of the start of the delay or start of the Change Order, Work Change Directive, or allowance authorization as adjusted by mutual, written agreement of the parties and ENGINEER.
5. Timing of Time Impact Analysis:
 - a. Submit each time impact analysis within five days after the following, as applicable:
 - 1) Start of the delay.
 - 2) After the submittal of Change Proposal to ENGINEER. For prime contracts other than General Contract, the number of days indicated shall be after General CONTRACTOR's receipt of information required to prepare time impact analysis. Other prime contractors shall submit information required for time impact analysis in a timely manner.
 - 3) After CONTRACTOR's Receipt of Work Change Directive. For prime contractors other than General CONTRACTOR, the number of days indicated shall be after General CONTRACTOR's receipt of information required to prepare time impact analysis. Other prime contractors shall submit information required for time impact analysis

- in a timely manner.
- b. General CONTRACTOR shall submit time impact analysis to affected other prime contractors concurrent with transmittal of time impact analysis submittal to ENGINEER.
 - c. Failure to Submit Time Impact Analysis:
 - 1) When General CONTRACTOR does not submit time impact analysis for a specific change or delay under the General Contract, within the specified period of time for such submittal, such non-submittal shall be construed that no extension of the Contract Times is required
 - 2) When prime contractor other than General CONTRACTOR does not submit information for General CONTRACTOR to prepare time impact analysis for a specific change or delay under the associated prime contract, within the specified period of time for such submittal, such non-submittal shall be construed that no extension of the Contract Times is required for that prime contract.
 - 3) If General CONTRACTOR fails to submit time impact analysis for a Change Proposal or Work Change Directive under another prime contract on the Project, said other prime contractor may be eligible for extension of the Contract Times despite General CONTRACTOR's failure to submit time impact analysis.

B. Evaluation by Engineer and Acceptance:

- 1. ENGINEER's evaluation of each time impact analysis comprised of complete information will be completed in timely manner after ENGINEER's receipt. Changes in the Contract Times will be made only by Change Order.
- 2. When mutual agreement is reached between the parties, including other affected prime contractors (if any), on effect of the change or delay in the Project, incorporate into the next Progress Schedule update the associated fragnets illustrating the influence of changes and delays.

1.12 RECOVERY SCHEDULES

A. General Provisions for Recovery Schedules:

- 1. When updated Progress Schedule indicates that the ability to comply with the Contract Times falls five or more days behind schedule, and there is no excusable delay, Change Order, or Work Change Directive to support an extension of the Contract Times, General CONTRACTOR shall prepare and submit a Progress Schedule demonstrating General CONTRACTOR's plan to accelerate the Project to achieve compliance with the Contract Times ("recovery schedule") for ENGINEER's acceptance.
- 2. When recovery schedule will affect another prime contractor on the Project, obtain input on proposed recovery schedule action from other prime contractors affected. Incorporate requirements of other prime contractors into the recovery schedule to the extent practicable.
- 3. Submit recovery schedule within five days after submittal of updated Progress Schedule where need for recovery schedule is indicated.

B. Implementation of Recovery Schedule:

1. At no additional cost to OWNER, do one or more of the following: furnish additional labor, provide additional construction equipment, provide suitable materials, employ additional work shifts, expedite procurement of materials and equipment to be incorporated into the Work, and other measures necessary to complete the Work within the Contract Times.
2. When prime contractor is required to accelerate their Work and incurs additional cost for such acceleration for reasons not due to the actions of that prime contractor, submit Change Proposal to ENGINEER.
3. Upon acceptance of recovery schedule by ENGINEER, incorporate recovery schedule into the next Progress Schedule update.

C. Lack of Action:

1. Prime contractor's refusal, failure, or neglect to take appropriate recovery action, or General CONTRACTOR's refusal to submit a recovery schedule, shall constitute reasonable evidence that CONTRACTOR is not prosecuting the Work or separable part thereof with the diligence that will ensure completion within the Contract Times. Such lack of action shall constitute sufficient basis for OWNER to exercise remedies available to OWNER under the Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. General CONTRACTOR shall retain photographer to perform services specified, including:
 - a. Digital photography.
 - b. Digital videography.
 - 2. Furnish photographic documentation for the following:
 - a. Pre-construction.
 - b. Construction progress.
 - c. Final.
- B. Image Quality:
 - 1. Photographic documentation shall be in color.
 - 2. Photographic images shall be suitably staged and set up (“framed”), focused, and shall have adequate lighting to illuminate the Work and conditions that are the subject of the photograph.
 - 3. For still photographs, use camera with minimum 16.0-megapixel resolution.

1.2 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Photographer:
 - a. Photographer shall be a specialist regularly engaged in professional photography and experienced in photographing construction sites.
 - b. Upon request of ENGINEER, submit documentation of photographer having successfully performed photographic documentation for not less than five previous construction projects, each lasting not less than six months.
- B. At the Site, ENGINEER or Resident Project Representative will indicate the views to be taken and will select time at which images will be taken. Photographic subjects, views, and angles will vary with progress of the Work.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Pre-construction Photographic Documentation: Submit acceptable pre-construction photographic documentation (prints and digital files) prior to mobilizing to and disturbing the Site. Submit pre-construction photographic

documentation not later than the first Application for Payment, unless other schedule for pre-construction photographic documentation is accepted by ENGINEER.

2. Construction Progress Photographic Documentation: Submit acceptable construction progress photographic documentation (prints and digital files) not less-often than monthly. Submit with each Application for Payment, unless otherwise agreed to by ENGINEER.

B. Closeout Submittals: Submit the following:

1. Final Photographic Documentation: Submit acceptable final photographic documentation (prints and digital files) prior to requesting the final inspection by ENGINEER.

1.4 PHOTOGRAPHIC DOCUMENTATION – GENERAL

A. Digital Files of Photographs:

1. For each photograph taken, furnish high-quality digital image in “JPG” file format compatible with Microsoft Windows 7 and higher operating systems.
2. Image resolution shall be sufficient for clear, high-resolution prints. Minimum resolution shall be 150 dots per inch (dpi). Minimum size of digital images shall be eight-inch by ten-inch size for regular photographs and 20-inch by 24-inch for aerial photographs.
3. Do not imprint date and time in the image.
4. Electronic image filename shall describe the image; do not submit filenames automatically created by digital camera. For example, an acceptable electronic filename would be, “Dewatering Building – Looking West at Centrifuge No. 2.jpg”.
5. Form of Digital Submittal – Image File Upload:
 - a. Upload digital files of Project photographic documentation to the Project website, as indicated in Section 01 31 26, Electronic Communication Protocols.
 - b. Upload files to new directory each time files are uploaded. Directory name shall be the date the photographs were taken (in the form of YEAR-MO-DAY), with brief general description of subject matter. Example: “2013-09-10 – Concrete Reinforcing in Slab”.

B. Videography:

1. Video shall be high-definition (HD), high-quality video of the Site and Project work.
2. All video files for the entire Project shall be submitted in one container file format. Video files shall be in one of the following container file formats:
 - a. AVI (Microsoft systems).
 - b. Flash Video (F4V, FLV; Adobe systems).
 - c. QuickTime File Format (MOV, QT; Apple, Inc.).
 - d. MP4 (“MPEG-4 Part 14”).
3. Video image shall have imprinted date and time that video was taken.
4. Include audio narration sufficient to explain the scenes shown.

5. Form of Digital Submittal – Video File Upload:
 - a. Upload digital files of Project photographic documentation to the Project website, as indicated in Section 01 31 26, Electronic Communication Protocols.
 - b. Upload files to new directory each time files are uploaded. Directory name shall be the date the video was taken (in the form of YEAR-MO-DAY), with brief general description of subject matter. Example: “2013-09-10 – Pouring Concrete Slab”.

1.5 PRE-CONSTRUCTION PHOTOGRAPHIC DOCUMENTATION

- A. Pre-construction Photographic Documentation:
 1. Obtain and submit sufficient pre-construction photographic documentation to record Site conditions prior to construction. Photographs shall document work areas of all prime contracts under the Project.
 2. Pre-construction photographs are not part of required number of construction progress photographs specified in Article 1.6 of this Section.
 3. Furnish pre-construction video of all work areas included in all prime contracts on the Project, including indoor and outdoor work areas and staging areas.
 4. Obtain and submit current, pre-construction aerial photographs of the Site, obtained within one month of the Effective Date of the Contract. Submit one oblique photograph taken from each cardinal direction (north, south, east, and west). Obtain permits or permission, as applicable, for required flyovers.
- B. If disagreement arises on the condition of the Site and insufficient pre-construction photographic documentation was submitted prior to the disagreement, restore the grounds or area in question to extent directed by ENGINEER and to satisfaction of ENGINEER.

1.6 CONSTRUCTION PROGRESS PHOTOGRAPHIC DOCUMENTATION

- A. Progress Photographs:
 1. Take photographs not less often than once per month.
 2. Take not less than thirty photographs each time photographer is at the Site.
 3. Maximum number of progress photographs required will be 240, based on the Contract Times to Substantial Completion of the entire Project and scope of the Project on date the Contract Times commence running. Proportionately modify the extent of photographic documentation if scope of the Project or the Contract Times are modified.
 4. Obtain and submit interior and exterior photographic documentation of each structure in the work area as directed by ENGINEER at the time photographic documentation is taken.
- B. Video:
 1. Obtain construction progress video each time photographer is at the Site.
 2. Construction progress videography shall cover all areas of work under each prime contract on the Project since the previous video was taken.

1.7 FINAL PHOTOGRAPHIC DOCUMENTATION

A. Final Photographs:

1. Take photographs at time and day acceptable to ENGINEER. Do not take final photographs prior to Substantial Completion of the entire Project. Work documented in final photographs shall be generally complete, including painting and finishing, furnishings, landscaping, and other visible Work
2. Take not less than 30 final photographs, based on scope of the Project at the time that the Contract Times commence running. Proportionately modify the number of final photographs if scope of Project is modified. Final photographs are not part of construction progress photographs required under Paragraph 1.6.A of this Section.
3. Obtain and submit aerial photographs of the Site following completion of restoration and landscaping, with final photographic documentation submittal. Furnish one oblique photograph taken from each cardinal direction (north, south, east, and west). Obtain permits or permission, as applicable, for required flyovers.

B. Video:

1. Record final video at same time that final photographs are taken.
2. Final videography shall cover all areas of the Project.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements governing the following types of Submittals:
1. Action Submittals that include:
 - a. Shop Drawings.
 - b. Product data.
 - c. Delegated design Submittals, which include documents prepared, sealed, and signed by a design professional retained by Contractor, Subcontractor, or Supplier for materials and equipment to be incorporated into the completed Work. Delegated design Submittals do not include Submittals related to temporary construction unless specified otherwise in the related Specifications Section. Delegated design Submittals include: design drawings, design data including calculations, specifications, certifications, and other Submittals prepared by such design professional.
 - d. Samples.
 - e. Testing plans, procedures, and testing limitations.
 2. Informational Submittals that include:
 - a. Certificates.
 - b. Design data not sealed and signed by a design professional retained by Contractor, Subcontractor, or Supplier.
 - c. Pre-construction test and evaluation reports, such as reports on pilot testing, subsurface investigations, testing for a potential Hazardous Environmental Condition, and similar reports.
 - d. Supplier instructions, including installation data, and instructions for handling, starting-up, and troubleshooting.
 - e. Source quality control Submittals (other than testing plans, procedures, and testing limitations), including results of shop testing.
 - f. Field or Site quality control Submittals (other than testing plans, procedures, and testing limitations), including results of operating and acceptability tests at the Site.
 - g. Supplier reports.
 - h. Sustainable design Submittals (other than sustainable design closeout documentation).
 - i. Special procedure Submittals, including plans for shutdowns and tie-ins and other procedural Submittals.
 - j. Qualifications statements.
 - k. Administrative Submittals including:

- 1) Progress Schedules.
 - 2) Schedules of Submittals.
 - 3) Schedules of Values.
 - 4) Photographic documentation.
 - 5) Coordination drawings, when submittal of such is required.
 - 6) Copies of permits obtained by Contractor.
 - 7) Field engineering reports, survey data, and similar information.
3. Closeout Submittals that include:
- a. Maintenance contracts.
 - b. Operations and maintenance data.
 - c. Bonds, such as special maintenance bonds and bonds for a specific material, equipment item, or system.
 - d. Warranty documentation.
 - e. Record documentation.
 - f. Sustainable design closeout documentation.
 - g. Software.
 - i. Keying.
- B. Not Included in this Section: Administrative and procedural requirements for following are covered elsewhere in the Contract Documents:
1. Requests for interpretations of the Contract Documents.
 2. Change Orders, Work Change Directives, and Field Orders.
 3. Applications for Payment
 4. Reports, documentation, and permit applications required to be furnished by Contractor to authorities having jurisdiction.
- C. When type of Submittal is not specified and is not included in the list above, request an interpretation from Engineer.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling
1. Provide Submittals well in advance of need for the material or equipment, or procedure (as applicable), in the Work and with ample time required for delivery of materials and equipment and to implement procedures following Engineer's approval or acceptance of the associated Submittal. Work covered by a Submittal will not be included in progress payments until approval or acceptance of related Submittals has been obtained in accordance with the Contract Documents.
 2. Samples and Submittals that are related to the same element of the Work or Specifications section should be furnished at the same time. Engineer will not review Submittals without associated Samples and will not review Samples without associated Shop Drawing or product data.
 3. Samples shall clearly illustrate functional characteristics of materials, all related parts and attachments, and full range of color, texture, pattern, and materials

B. Coordination for Multiple Prime Contracts

1. Expedite Submittals for Work that requires coordination with work of other contractors.
2. Simultaneously with furnishing Submittal to Engineer, transmit to each other prime contractor one copy of each Submittal, with transmittal letter to other contractors advising that Submittal is being furnished to Engineer.
3. Upon receipt of Submittal from another contractor, Contractor shall determine its effect on the Work. Within five days of receipt of Submittal, Contractor shall advise Engineer in writing of interferences, objections, or questions and request clarification.
4. If no interferences, objections, or questions are reported by other contractors within time specified, Engineer will assume that none exist and will review the Submittal. If Contractor fails to report interferences or objections of other contractors within time specified, Contractor shall, at no additional cost to Owner, do all cutting, restoring, or relocating that may result from interference or inconsistency with work performed relative to the Submittal as approved or accepted by Engineer.
5. After Submittal is approved or accepted by Engineer, the Engineer will distribute one copy to each other prime contractor, except for those Submittals that do not require written response from Engineer.

C. Dimensions

1. Contractor is responsible for dimensions to be confirmed and corrected at the Site; quantities; information pertaining solely to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.

D. Representation

1. Contractor's signature on Submittal's stamp and letter of transmittal shall be Contractor's representation that Contractor has complied with his obligations under the Contract Documents relative to that Submittal. Engineer and Owner shall be entitled to rely on such representations by Contractor.

1.3 SCHEDULE OF SUBMITTALS

A. Timing:

1. Furnish Schedule of Submittals within time frames indicated in the Contract Documents.
2. Submit updated Schedule of Submittals with each Submittal of the updated Progress Schedule.

B. Content: Identify on Schedule of Submittals all Submittals required in the Contract Documents. Requirements for content of preliminary Schedule of Submittals and

subsequent updates of the Schedule of Submittals are identical. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Indicate Submittals that are on the Project's critical path. Indicate the following for each Submittal:

1. Date by which Submittal will be received by Engineer.
 2. Whether Submittal will be for a substitution or "or-equal". Procedures for requesting approval of substitutes and "or-equals" are specified in the General Conditions, Section 01 25 00, Substitution Procedures, and Section 01 62 00, Product Options (for "or-equals").
 3. Date by which Engineer's response is required. Not less than 14 days shall be allowed for Engineer's review, starting upon Engineer's actual receipt of each Submittal. Allow increased time for large or complex Submittals.
 4. For Submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of other contractors, if any.
- C. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules in Section 01 32 16, Progress Schedule.
- D. Coordinate Schedule of Submittals with the Progress Schedule.
- E. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate Submittals on the Project's critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include Submittals not required by the Contract Documents.
- F. In preparing Schedule of Submittals
1. Consider the nature and complexity of each Submittal, and allow sufficient time for review and revision.
 2. Reasonable time shall be allowed for: Engineer's review and processing of Submittals, for Submittals to be revised and resubmitted, and for returning Submittals to Contractor.
 3. Identify and accordingly schedule Submittals that are expected to have long anticipated review times.

1.4 PROCEDURE FOR SUBMITTALS

- A. Submittal Identification System: Use the following Submittal identification system, consisting of Submittal number and review cycle number.
1. Submittal Number: Shall be separate and unique number correlating to each individual Submittal required. Assign Submittal numbers as follows:
 - a. First part of Submittal number shall be the applicable Specifications Section number, followed by a hyphen.
 - b. Second part of Submittal number shall be a three-digit number (sequentially numbered from 001 through 999) assigned to each separate and unique Submittal furnished under the associated Specifications Section.

- c. Submittal number for the third Submittal furnished for Section 40 05 19, Ductile Iron Process Pipe, would be “40 05 19-003”.
2. Review Cycle Number: Shall be a (1) designation indicating the initial Submittal or re-submittal associated with each Submittal number:
 - a. “(2)” = Initial (first) Submittal.
 - b. “(3)” = Second Submittal (e.g., first re-submittal).
 - c. “(4)” = Third Submittal (e.g., second re-submittal).
3. Examples:

Example Description	Submittal Identification	
	Submittal No.	Review Cycle
Initial (first) review cycle of the third Submittal provided under Section 40 05 19, Ductile Iron Process Pipe	40 05 19-003-	(5)
Second review cycle (first re-submittal) of third Submittal provided under Section 40 05 19, Ductile Iron Process Pipe	40 05 19-003-	(6)

- B. Letter of Transmittal for Submittals:
 1. Each letter of transmittal shall be for one Specifications Section.
 2. At beginning of each letter of transmittal, include a reference heading indicating: Contractor’s name, Owner’s name, Project name, Contract designation, transmittal number, and Submittal number.
 3. For Submittals with proposed deviations from requirements of the Contract Documents, letter of transmittal shall specifically describe each proposed variation.
- C. Contractor’s Review and Stamp:
 1. Contractor’s Review: Before transmitting Submittals to Engineer, review Submittals to:
 - a. ensure proper coordination of the Work;
 - b. determine that each Submittal is in accordance with Contractor’s needs;
 - c. verify that Submittal contains sufficient information for Engineer to determine compliance with the Contract Documents.
 2. Incomplete or inadequate Submittals will be returned without review.
 3. Contractor’s Stamp and Signature:
 - a. Each Submittal furnished shall bear Contractor’s stamp of approval and signature, as evidence that Submittal has been reviewed by Contractor and verified as complete and in accordance with the Contract Documents.
 - b. Submittals without Contractor’s stamp and signature will be returned without review. Signatures that appear to be computer-generated will be regarded as unsigned and the associated Submittal will be returned without review.
 - c. Contractor’s stamp shall contain the following:

“Project Name: _____

Contractor’s Name: _____

Contract _____ Designation: _____

Date: _____

----- *Reference* -----

Submittal Title: _____

Specifications:

Section: _____

Page No.: _____

Paragraph No.: _____

Drawing No.: _____ of _____

Location of Work: _____

Submittal No. and Review Cycle: _____

Coordinated by Contractor with Submittal Nos.: _____

I hereby certify that the Contractor has satisfied Contractor’s obligations under the Contract Documents relative to Contractor’s review and approval of this Submittal.

Approved for Contractor by: _____”

D. Submittal Marking and Organization:

1. Mark on each page of Submittal and each individual component submitted with Submittal number and applicable Specifications paragraph.
2. Arrange Submittal information in same order as requirements are written in the associated Specifications Section.
3. Each Shop Drawing sheet shall have title block with complete identifying information satisfactory to Engineer.
4. Package together Submittals for the same Specifications Section. Do not furnish required information piecemeal.

E. Format of Submittal and Recipients:

1. Action Submittals and Informational Submittals: Furnish in accordance with Table 01 33 00-A:

**TABLE 01 33 00-A: SUBMITTAL CONTACTS
AND REQUIRED FORMAT**

	Address for Deliveries	Contact Person	E-mail Address	Format*	No. of Printed Copies
a.	Engineer: Arcadis	TBD	TBD@arcadis-us.com	E	Zero
b.	Resident Project Representative: At the Site.	TBD	TBD@arcadis-us.com	E & P	One
c.	Other Prime Contractors (addresses TBD)	TBD	TBD	E	Zero
* Format: E = Electronic files; P = Printed copies. TBD = To Be Determined					

2. Samples:

- a. Securely label or tag Samples with Submittal identification number. Label or tag shall include clear space at least four inches by four inches in size for affixing Engineer's review stamp. Label or tag shall not cover, conceal, or alter appearance or features of Sample. Label or tag shall not be separated from the Sample.
- b. Submit quantity of Samples required in Specifications. If quantity of Samples is not indicated in the associated Specifications Section, furnish not less than three identical Samples of each item required for Engineer's approval. Samples will not be returned to Contractor. If Contractor requires Sample(s) for Contractor's use, so advise Engineer in writing and furnish additional Sample(s). Contractor is responsible for furnishing, shipping, and transporting additional Samples.
- c. Deliver one Sample to Engineer's field office at the Site. Deliver balance of Samples to Engineer at address indicated in Table 01 33 00-A, unless otherwise directed by Engineer.

3. Closeout Submittals:

- a. Furnish the following Closeout Submittals in accordance with Table 01 33 00-A: maintenance contracts; bonds for specific materials, equipment, or systems; warranty documentation; and sustainable design closeout documentation. On documents such as maintenance contracts and bonds, include on each document furnished original ("wet") signature of entity issuing said document. When original "wet" signatures are required, furnish such Submittals in printed form and electronic form to Engineer, and to other entities furnish as indicated in Table 01 33 00-A.
- b. Operations and Maintenance Data: Submit in accordance with Section 01 78 23, Operation and Maintenance Data.
- c. Record Documentation: Submit in accordance with Section 01 78 39, Project Record Documentation.
- d. Software: Submit number of copies required in Specifications Section where the software is specified. If number of copies is not specified, provide two copies on compact disc in addition to software loaded on Owner's computer(s) or microprocessor(s).

4. Maintenance Material Submittals: For spare parts, extra stock materials, and tools, furnish quantity of items specified in associated Specifications Section. Furnish in accordance with Section 01 78 43, Spare Parts and Extra Materials.
- F. Electronic Submittals:
1. Format: Electronic files shall be in accordance with Section 01 31 26, Electronic Document Protocol. Files shall be electronically searchable.
 2. Organization and Content:
 - a. Each electronic Submittal shall be one file; do not divide individual Submittals into multiple files.
 - b. When Submittal is large or contains multiple parts, furnish PDF file with bookmark for each section of Submittal.
 - c. Content shall be identical to printed Submittal. First page of electronic Submittal shall be Contractor's letter of transmittal.
 3. Quality and Legibility: Electronic Submittal files shall be made from the original and shall be clear and legible. Do not submit scans of faxed copies. Electronic file shall be full size of original, printed documents. Properly orient all pages for reading on a computer screen.
 5. Submitting Electronic Files:
 - a. Transmit electronic files in accordance with Section 01 31 26, Electronic Document Protocol.
- G. Distribution:
1. Distribution of Engineer's Response via Electronic Files: Upon completion of Engineer's review, electronic Submittal response will be distributed by Engineer to
 - a. Contractor.
 - b. Other prime contractors.
 - c. Owner.
 - d. Resident Project Representative (RPR).
 - e. Engineer's file.
- H. Resubmittals: Refer to the General Conditions for requirements regarding resubmitting required Submittals.

1.5 ENGINEER'S REVIEW

- A. Submittals not required by the Contract Documents will not be reviewed by Engineer nor be recorded in Engineer's Submittal log and the Contractor will be advised accordingly and all printed copies of such Submittals will be returned to Contractor. Electronic copies of such Submittals, if any, will not be retained by Engineer.
- B. Action Submittals, Results of Engineer's Review: Each Submittal will be given one of the following dispositions by Engineer:
1. Approved: Upon return of Submittal marked "Approved", order, ship, or fabricate materials and equipment included in the Submittal (pending

Engineer's approval or acceptance, as applicable, of source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents.

2. Approved as Corrected: Upon return of Submittal marked "Approved as Corrected", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents, and in accordance with the corrections indicated in the Engineer's Submittal response.
3. Approved as Corrected – Resubmit: Upon return of Submittal marked "Approved as Corrected – Resubmit", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents, and in accordance with corrections indicated in Engineer's Submittal response. Furnish to Engineer a re-submittal with all corrections made. Receipt of corrected re-submittal is required before materials or equipment covered in the Submittal will be eligible for payment.
4. Revise and Resubmit: Upon return of Submittal marked "Revise and Resubmit", make the corrections indicated and re-submit to Engineer for approval.
5. Not Approved: This disposition indicates material or equipment that cannot be approved. Upon return of Submittal marked "Not Approved", repeat initial Submittal procedure utilizing approvable material or equipment, with a complete Submittal clearly indicating all information required.

C. Informational Submittals, Results of Engineer's Review:

1. Each Submittal will be given one of the following dispositions:
 - a. Accepted: Information included in Submittal complies with the applicable requirements of the Contract Documents, and is acceptable. No further action by Contractor is required relative to this Submittal, and the Work covered by the Submittal may proceed, and materials and equipment with Submittals with this disposition may be shipped or operated, as applicable.
 - b. Not Accepted: Submittal does not indicate compliance with applicable requirements of the Contract Documents and is not acceptable. Revise Submittal and re-submit to indicate acceptability and compliance with the Contract Documents.
2. The following types of Informational Submittals, when acceptable to Engineer, will not receive a written response from Engineer. Disposition as "accepted" will be recorded in Engineer's Submittal log. When Submittals of the following are not acceptable, Engineer will provide written response to Contractor
 - a. Safety data sheets (MSDS).
 - b. Compaction testing reports.
 - c. Concrete testing reports.

d. Manufacturer's instructions.

- E. Closeout Submittals, Results of Engineer's Review: Dispositions and meanings are the same as specified for Informational Submittals. When acceptable, Closeout Submittals will not receive a written response from Engineer. Disposition as "accepted" will be recorded in Engineer's Submittal log. When Closeout Submittal is not acceptable, Engineer will provide written response to Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 35 23

SAFETY REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section augments the requirements elsewhere in the Contract Documents regarding CONTRACTOR's responsibilities for safety and protection and includes requirements for CONTRACTOR's safety representative and other safety requirements applicable to the Project.
2. CONTRACTOR shall provide labor, materials, tools, equipment, training, certifications, protective measures, and incidentals shown, specified, and required to comply with CONTRACTOR's obligations under the Contract for safety and protection of personnel and property.
3. The following OWNER safety programs are applicable to the Work:
 - a. None.

B. Coordination:

1. When multiple contractors are working at the Site, CONTRACTOR shall communicate to each other contractor, OWNER, ENGINEER, and other entities working at the Site those elements of CONTRACTOR's safety program with which such other entities are to comply.

C. Related Sections: Provisions of this Section are coordinated with, but are not limited to, the following:

1. Section 01 35 43.13, Environmental Procedures for Hazardous Materials.
2. Section 01 35 44, Spill Prevention Control and Countermeasures Plan.
3. Section 01 71 33, Protection of the Work and Property.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. CONTRACTOR's Safety Representative:
 - a. ENGINEER's acceptance of CONTRACTOR's safety representative's qualifications does not in any way mitigate or relieve CONTRACTOR of CONTRACTOR's safety obligations under the Contract Documents.
 - b. CONTRACTOR's safety representative shall possess not less than five years of experience serving as the safety representative on projects similar to or larger in size than this Contract, and for type(s) of construction similar in nature to the Work.
 - c. CONTRACTOR's safety representative shall be experienced in the types of Work to be performed under the Contract and shall be experienced

with safety precautions, procedures, and equipment appropriate for the safe performance of the Work.

- d. Prior to the Effective Date of the Contract, shall have successfully completed a 30-hour OSHA Construction Safety and Health training course, and a 40-hour OSHA Hazardous Materials training course, and training for confined space entry.
- e. CONTRACTOR's safety representative shall be completely experienced with and knowledgeable of all applicable health and safety Laws and Regulations and with good safety practices, and shall ensure compliance with such Laws and Regulations and practices at the Site.
- f. f. CONTRACTOR's safety representative shall possess one of the following, valid accreditation:
 - 1) Certified Hazardous Materials Manager (CHMM) issued by the Institute of Hazardous Materials Management; CIH proposed shall be experienced in ABIH's practice areas of community stressors and hazard controls; or
 - 2) Certified Industrial Hygienist (CIH) issued by the American Board of Industrial Hygiene (ABIH); or
 - 3) Certified Safety Professional (CSP) issued by the Board of Certified Safety Professionals (BCSP).
- g. Minimum responsibilities of CONTRACTOR's safety representative are indicated in this Section.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Emergency contact information, in accordance with Article 1.5 of this Section.
 - 2. Citations:
 - a. Copies of safety citations from authorities having jurisdiction and insurance companies, submitted within 24 hours of CONTRACTOR's receipt of such citations.
 - 3. Qualifications Statements:
 - a. CONTRACTOR's Safety Representative: Submit name and qualifications of CONTRACTOR's safety representative, including summary of experience, and training received and valid certifications and accreditations applicable to the Project.

1.4 SAFETY REPRESENTATIVE RESPONSIBILITIES

- A. General:
 - 1. CONTRACTOR's safety representative shall be at the Site full-time when Work is in progress. When CONTRACTOR employs multiple shifts, furnish more than one safety representative as necessary.
 - 2. CONTRACTOR's safety representative shall have no other duties on the Project except those directly related to safety. Safety representative shall not be CONTRACTOR's project manager, field engineer, superintendent, or other supervisory personnel working on the Project.

3. CONTRACTOR's safety representative shall have appropriate space at the Site to maintain and keep available safety records, up-to-date copies of pertinent safety Laws and Regulations, Material Data Sheets, CONTRACTOR's site-specific health and safety plan, copies of OWNER's health and safety requirements with which CONTRACTOR shall comply, and the Site safety plan including information concerning foreseeable emergency conditions, and emergency contact information as required in Article 1.5 of this Section.
- B. CONTRACTOR's safety representative's responsibilities include:
1. Duties and responsibilities in accordance with the General Conditions.
 2. CONTRACTOR's safety representative shall coordinate with CONTRACTOR's "competent person" required under Laws and Regulations.
 3. CONTRACTOR's safety representative shall attend progress meetings in accordance with Section 01 31 19.23, Progress Meetings.
 4. Schedule and conduct safety meetings and safety training programs as required by Laws and Regulations, CONTRACTOR's Site-specific health and safety plan (SSHASP), and good safety practices. Include in the SSHASP a specific schedule (dates) of such meetings and an outline of materials to be covered. Advise ENGINEER prior to the time and place of such meetings. Invite OWNER's personnel to meetings. Instruct CONTRACTOR's employees (and Subcontractors, Suppliers with personnel at the Site, and others for whom CONTRACTOR is responsible) on recognition of hazards, observance of precautions, of the contents of the SSHASP and other safety programs with which CONTRACTOR shall comply, and use of personal protective equipment (PPE) and safety equipment.
 5. Determine that operators of specific construction equipment (and permanent equipment used for construction operations) are qualified by training and experience before such personnel are allowed to operate such equipment.
 6. Develop and implement emergency response procedures, including names, locations, and contact telephone numbers for emergency services and medical assistance as indicated in requirements for the emergency contact list in Article 1.5 of this Section.
 7. Post appropriate notices regarding health and safety Laws and Regulations at locations at the Site and CONTRACTOR's office that afford maximum exposure to personnel.
 8. Post appropriate instructions and warning signs in regard to all hazardous areas and hazardous conditions that cannot be eliminated. Identification of such areas shall be based on experience, site surveillance, and severity of the associated hazard. Signage shall not be used in place of appropriate workplace controls.
 9. Ascertain via personal inspection that safety Laws and Regulations and safety program requirements are enforced. Make inspections not less than once per work shift to ensure that machines, tools, and equipment are in a safe operating condition; and that all work areas are free of hazards to the extent practicable. Implement necessary and timely corrective actions to eliminate unsafe acts and unsafe conditions, and submit to ARCADIS daily copy of findings resulting from inspection, using inspection checklist forms established in

CONTRACTOR's SSHASP.

10. Submit to ENGINEER copies of safety citations from authorities having jurisdiction and insurance companies within 24 hours of CONTRACTOR's receipt of such citations.
11. Provide appropriate orientation to employees, visitors, Subcontractors, and Supplier personnel at the Site.
12. Perform all related tasks necessary to achieve the highest degree of safety that the nature of the Work allows.

1.5 EMERGENCY CONTACT INFORMATION

- A. CONTRACTOR shall submit list of emergency contact information for 24-hour use throughout the Project. Emergency contact information shall be updated and kept current throughout the Project. If personnel or contact information change, furnish updated emergency contact information list at the next progress meeting.
- B. CONTRACTOR's list of emergency contact information shall include:
 1. CONTRACTOR's project manager's office, field office, cellular, and home telephone numbers.
 2. CONTRACTOR's Site superintendent's office, field office, cellular, and home telephone numbers.
 3. CONTRACTOR's foreman's field office, cellular (if available), and home telephone numbers.
 4. CONTRACTOR's safety representative's office, cellular, and home telephone numbers.
 5. Major Subcontractors' and Suppliers' office, cellular, and home telephone numbers of project manager and foreman (when applicable).
- C. Additional Emergency Contact Information:
 1. OWNER's Site Manager: office, cellular, and home telephone numbers.
 2. OWNER's Project Manager: office, cellular, and home telephone numbers.
 3. OWNER's central 24-hour emergency telephone number.
 4. ENGINEER's project manager's office, cellular, and home telephone numbers.
 5. ENGINEER's project engineer's office, cellular, and home telephone numbers.
 6. Resident Project Representative's office, field office, cellular, and home telephone numbers.
 7. Utility companies' 24-hour contact telephone number(s), including gas, water, sewer, oil, telephone, cable television/telecommunications, and other companies or concerns having utilities in the vicinity of the Work.
 8. Highway and street owners' 24-hour telephone number(s).
 9. Emergency telephone numbers, including: "Emergency: Dial 911", and seven-digit telephone numbers for the hospital, ambulance, police, and fire department nearest to the Site. Furnish names of each of these institutions.
 10. Other involved entities as applicable.
 11. Include with list of emergency contact information an 8.5-inch by 11-inch map showing route from the Site to the nearest hospital.

- D. Emergency Contact Information for Multiple-Prime Contract Project:
1. General CONTRACTOR shall have responsibility to assemble all emergency contact information into a single emergency contact list for the Project, and shall maintain, update, and redistribute the listing throughout the Project.
 2. Prime contractors other than General CONTRACTOR are not required to submit the “additional emergency contact information” indicated in Paragraph 1.5.C of this Section.
 3. Prime contractors other than General CONTRACTOR shall promptly furnish to General CONTRACTOR updated emergency contact information when prime contractor’s emergency contact information or personnel change.

1.6 SAFETY EQUIPMENT

- A. General:
1. CONTRACTOR shall provide proper safety and rescue equipment, adequately maintained and readily available, for any foreseeable contingency.
 2. Such equipment shall include items such as safety ropes and harnesses, fall-prevention devices, stretchers, water safety devices, oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, combustible gas detectors, fire extinguishers and first-aid equipment in accordance with the Division 01 Specifications, and similar equipment.
 3. Keep safety equipment in protected areas. Check safety equipment at scheduled intervals.
 4. Temporary First-Aid Facilities: Provide and maintain in accordance with Section 01 51 05, Temporary Facilities.
- B. Safety Equipment Log:
1. Maintain a log indicating the person who checked the equipment, when equipment was checked, and that equipment was acceptable.
 2. Update equipment log not less-often than monthly.
 3. Include in safety representative’s onsite records copies of equipment calibration records.
- C. Provide replacement safety equipment when primary safety equipment is unavailable due to use or when undergoing maintenance.
- D. Personal Protective Equipment (PPE):
1. All persons entering the work areas shall wear appropriate PPE required for the particular area.
 2. Remove from the Site any person failing to comply with this or any other safety requirement.
 3. Continuously provide all necessary PPE for ENGINEER’s employees, Resident Project Representative, and consultants. ENGINEER will furnish for ENGINEER’s employees and consultants protective helmets (hard hats), safety eyewear, reflective vests, and hearing protection. CONTRACTOR shall furnish other equipment required.

1.7 EVACUATION DRILL

- A. Included in CONTRACTOR's SSHASP shall be evacuation drills, conducted not less-often than once every six months, scheduled and conducted by CONTRACTOR under supervision of CONTRACTOR's safety representative.
- B. Perform evacuation drill during regular working hours, scheduled to minimize disruption of the Work.
- C. Upon evacuation, CONTRACTOR and all personnel for whom CONTRACTOR is responsible, immediately advise ENGINEER's onsite personnel and OWNER's facility manager that all personnel have been evacuated.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 35 43.13

ENVIRONMENTAL PROCEDURES FOR HAZARDOUS MATERIALS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, tools, and incidentals necessary to comply with environmental procedures for Constituents of Concern.
2. CONTRACTOR shall develop, implement, and maintain throughout the Project a hazardous materials management program (HMMP) in accordance with Laws and Regulations.
3. Constituents of Concern Brought to Site by CONTRACTOR: Transport, handle, store, label, use, and dispose of in accordance with this Section, other applicable provisions of the Contract Documents, and Laws and Regulations.
4. Constituents of Concern Generated by CONTRACTOR:
 - a. Materials containing Constituents of Concern shall be properly handled, stored, labeled, transported and disposed of by CONTRACTOR in accordance with Laws and Regulations, and this Section.
 - b. If CONTRACTOR will generate or has generated materials containing Constituents of Concern at the Site, obtain a USEPA identification number listing CONTRACTOR's name and address of the Site as generator of the Constituents of Concern. Obtain identification number from state environmental agency or similar authority having jurisdiction at the Site. Submit identification number within time frame specified in Article 1.3 of this Section.
 - c. CONTRACTOR shall be responsible for identifying, analyzing, profiling, transporting, and disposing of Constituents of Concern generated by CONTRACTOR.
5. Fines or civil penalties levied against OWNER for violations committed at the Site by CONTRACTOR, and costs to OWNER (if any) associated with cleanup of a Hazardous Environmental Condition created by CONTRACTOR shall be paid by CONTRACTOR. If CONTRACTOR has exacerbated a Hazardous Environmental Condition existing at the Site prior to the start of the Work, CONTRACTOR shall pay a share of costs associated with fines, civil penalties, and cleanup costs to in proportion equal to the extent of CONTRACTOR's responsibility for creating the Hazardous Environmental Condition and fines and civil penalties associated therewith.
6. OWNER's environmental representative is: TBD.

B. Enforcement of Laws and Regulations:

1. Interests of OWNER are that accidental spills and emissions, Site contamination, and injury of personnel at and near the Site are to be avoided.

2. When OWNER is aware of suspected violations, OWNER will notify CONTRACTOR, and authorities having jurisdiction if OWNER reasonably concludes that doing so is required by Laws or Regulations.
3. Responsibilities regarding Laws and Regulations shall be in accordance with the General Conditions, as may be modified by the Supplementary Conditions.

C. Related Sections:

1. Section 01 35 44, Spill Prevention Control and Countermeasures Plan.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with Laws and Regulations, including but not limited to the following:
1. 29 CFR 1910, OCCUPATIONAL SAFETY AND HEALTH STANDARDS.
 2. 29 CFR 1926, SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
 3. 40 CFR, PROTECTION OF ENVIRONMENT.
 4. 49 CFR, TRANSPORTATION.
 5. OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS OF STATE LABOR DEPARTMENT OR SIMILAR ENTITY; ENVIRONMENTAL LAWS AND REGULATIONS OF STATE ENVIRONMENTAL AGENCY, LAWS AND REGULATIONS OF STATE DEPARTMENT OF TRANSPORTATION.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following to the entity(ies) specified for each:
1. Constituents of Concern (including Chemicals) Proposed for Use at the Site:
 - a. Content:
 - 1) Current (dated within the past two years) material safety data sheets (MSDS) in accordance with 29 CFR 1910.1200 (OSHA Hazard Communication Standard).
 - 2) Manufacturer of material or equipment containing such substance.
 - 3) Supplier (if different than manufacturer).
 - 4) Container size(s) and number of containers proposed to be at the Site.
 - 5) Minimum and maximum volume of material intended to be stored at the Site.
 - 6) Description of process or procedures in which Constituent of Concern will be used at the Site.
 - b. Furnish the information required above in sufficient time to obtain OWNER's acceptance not later least three days before bringing Constituent of Concern to the Site.
 - c. Submit to OWNER's environmental representative with copy to ENGINEER.
 2. Material Containing Constituents of Concern Generated at the Site:
 - a. Submit for each Constituent of Concern generated at the Site identification number, analysis results, and number and size of storage

- containers at the Site.
- b. Furnish such information within not less than 48 hours after CONTRACTOR's receipt of analytical results.
- c. Submit to OWNER's environmental representative with copy to ENGINEER.
- 3. Permits:
 - a. Submit copies of permits for storing, handling, using, transporting, and disposing of materials containing Constituents of Concern, obtained from authorities having jurisdiction.
 - b. Submit to OWNER's environmental representative with copy to ENGINEER.
- 4. Other Documents required for the HMMP: Submit to OWNER's environmental representative the requested documents within 72 hours of CONTRACTOR's receipt of such request. HMMP documents may include emergency/spill response plan, communication plan, and other documents.

1.4 HAZARDOUS MATERIALS MANAGEMENT

- A. Obtain OWNER's environmental representative's acceptance before bringing to the Site each material containing a Constituent of Concern.
- B. Communication Plan:
 - 1. CONTRACTOR shall develop a communication plan relative to materials containing one or more Constituents of Concern.
 - 2. MSDS Notebooks:
 - a. At minimum, maintain at the Site two notebooks containing: 1) Inventory of materials containing a Constituent of Concern (including all chemicals); and 2) Current (dated within the past two years) material safety data sheets (MSDS) for all materials being used to accomplish the Work, whether or not defined as a Constituent of Concern.
 - b. Keep one notebook in CONTRACTOR's field office at the Site; keep second notebook at location acceptable by OWNER's environmental representative.
 - c. Keep notebooks up-to-date as materials are brought to and removed from the Site.
- C. Emergency/Spill Response Plan: Develop, implement, and maintain an emergency/spill response plan, for each Constituent of Concern or each class/group of material containing a Constituent of Concern, as applicable. At minimum, response plan shall include the following:
 - 1. Description of equipment available at the Site to contain or respond to emergency related to or spill of the material.
 - 2. Procedures for notifying, and contact information for: authorities having jurisdiction, emergency responders, OWNER, ENGINEER, the public as applicable, and other entities as required.
 - 3. Response coordination procedures between CONTRACTOR, OWNER, and others as appropriate.

4. Site plan showing proposed location of Constituents of Concern storage area and location of spill containment/response equipment, and location of storm water drainage inlets and drainage routes, including storm sewers, ditches and swales, and surface waters.
 5. Description of Constituent of Concern handling and spill response training provided to CONTRACTOR's and Subcontractors' employees, in accordance with 29 CFR 1926.21(b) and other Laws and Regulations.
 6. Comply with Section 01 35 44, Spill Prevention Control and Countermeasures Plan.
- D. Storage of Materials Containing Constituents of Concern and Storage of Non-Hazardous Materials:
1. Vessels containing materials with a Constituent of Concern shall bear applicable hazard diamond(s).
 2. Container Labeling:
 - a. Properly label each container of consumable materials, whether or not classified as containing a Constituent of Concern.
 - b. Stencil CONTRACTOR's name and, as applicable, Subcontractor's name, on each vessel containing a Constituent of Concern and, for non-hazardous materials, on each container over five-gallon capacity. Containers shall bear securely-attached label clearly identifying contents. Label containers that are filled from larger containers.
 - c. If OWNER becomes aware of unlabeled containers at the Site, OWNER's environmental representative will so advise CONTRACTOR. Properly label container(s) within one hour of receipt of such notice from OWNER or remove container from the Site.
 3. To greatest extent possible, store off-Site materials containing a Constituent of Concern until required for use in the Work.
- E. Area for Storing Materials Containing a Constituent of Concern:
1. Maintain designated storage area for materials containing a Constituent of Concern. Storage area shall include secondary containment to prevent release of spilled or leaking substances. Storage area shall include barriers to prevent vehicles from colliding with storage containers, and shall include protection from environmental factors such as weather.
 2. Provide signage in accordance with Laws and Regulations, clearly identifying the storage area.
- F. Not less than monthly, CONTRACTOR's safety representative shall meet with OWNER's environmental representative to review CONTRACTOR's HMMP documents, procedures, and inspect storage areas and the Site in general, to verify compliance with this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 35 44

SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section pertains to spill prevention control and countermeasures applicable to the Project under the provisions of 40 CFR 112 and other Laws and Regulations.
2. CONTRACTOR shall provide all labor, materials, equipment, tools, professional services (when required), and incidentals as shown, specified, and required to comply with Laws and Regulations regarding spill prevention control and countermeasures (SPCC) planning and compliance, including 40 CFR 112.
3. Multiple Prime Contracts:
 - a. General CONTRACTOR shall determine whether a SPCC Plan is required. Other prime contractors shall furnish to General CONTRACTOR information and data relative to the work under their respective contracts as necessary for determining whether the Project requires a SPCC Plan.
 - b. When SPCC Plan is required, General CONTRACTOR shall prepare, implement, and maintain SPCC Plan as required by Laws and Regulations.
 - c. In cooperation with the General CONTRACTOR, each prime contractor at the Site shall implement the SPCC Plan for tanks at the Site used by such prime contractor.
 - d. General CONTRACTOR shall have overall responsibility for the Project's SPCC Plan.

1.2 DETERMINATION OF NEED FOR SPCC PLAN FOR PROJECT

A. Determination of Need for SPCC Plan:

1. General CONTRACTOR shall determine need for SPCC Plan for the Project.
2. CONTRACTOR's Professional Engineer:
 - a. If the Site will include storage of more than 10,000 gallons of oil in above-ground storage, or if the Site does not comply with oil discharge history criteria specified in 40 CFR 112, CONTRACTOR shall retain a qualified professional engineer to determine need for SPCC Plan for the Project and, if SPCC Plan is required, professional engineer shall prepare or supervise preparation of SPCC Plan for the Project.
 - b. If a professional engineer is not required to prepare the full SPCC Plan for the Project, but the SPCC Plan includes environmentally-

equivalent SPCC measures, or impracticality determinations, CONTRACTOR shall retain a qualified professional engineer to prepare and certify those portions of the SPCC Plan dealing with environmentally equivalent measures and impracticality determinations; the balance of the SPCC Plan may be prepared by and be self-certified by CONTRACTOR.

3. Submit to ENGINEER letter presenting results of evaluation of whether a SPCC Plan is required for the Project in accordance with Laws and Regulations.
- B. SPCC Plan is required when the Project activities at the Site meet the following criteria:
1. The Site and activities thereon are not exempt from Laws and Regulations relative to SPCC planning and implementation.
 2. Oil is stored, used, transferred, or otherwise handled at the Site, unless otherwise exempted by Laws and Regulations.
 3. Maximum oil storage capacity at the Site equals or exceeds either of the following thresholds: 42,000 gallons of completely-buried capacity, or 1,320 of above-ground capacity. Capacity includes total storage tank volume and operational storage volume at the Site for contractors and Subcontractors, including bulk storage tanks, containers with 55-gallon storage capacity and larger, mobile tanks located at the Site, and other containers covered by Laws and Regulations. Exempt are motive storage containers, such as those on construction equipment and vehicles. Oil includes petroleum products, fuel oil, hydraulic fluid, oil sludge, oil refuse, oil mixed with wastes other than dredged material, synthetic oil, vegetable oil, animal fats and oils, and other oils defined in Laws and Regulations.
 4. There is reasonable expectation, based on location of the Site, that oil spill would reach navigable waters of the United States or adjoining shorelines.
- C. When SPCC Plan is not required, General CONTRACTOR shall ensure that conditions that preclude the need for SPCC Plan for the Project, including the activities of all contractors and Subcontractors working on the Project at the Site, are maintained throughout duration of the Project. Should changes that affect the storage, use, or handling of oil at the Site occur, reassess the need for SPCC Plan for the Project at no additional cost to OWNER and submit to ENGINEER evaluation letter regarding need for SPCC Plan.

1.3 SPCC PLAN AND IMPLEMENTATION

- A. When SPCC Plan is required, develop SPCC Plan and submit for acceptance by OWNER, with copy to ENGINEER. SPCC Plan shall be specific to the Site and the Project and shall include the following:
1. Seal or stamp, original signature, and license number of CONTRACTOR'S professional engineer, when self-certification by CONTRACTOR is not allowed by Laws and Regulations.

2. Site plan identifying the name (or tag number) and location of each tank and container that will contain a substance regulated in 40 CFR 112 and other Laws and Regulations, including above-ground and buried tanks. Site plan shall indicate general directions of storm water runoff, including storm sewers and drainage inlets (including arrows indicating directions of flow), and storm sewer outfall locations shown and labeled.
3. For each tank and container shown or indicated on the Site plan, include a table that lists the tank or container's name and tag number, type of oil stored therein, and maximum storage capacity. List total storage capacity of all regulated tanks and containers at the Site covered by SPCC Laws and Regulations.
4. Predictions of direction, rate of flow, and total quantity of oil that could be discharged from the Site as result of storage tank or container failure.
5. Operating procedures that prevent oil spills, including procedures for oil handling, details of secondary containment structures at fuel and oil transfer areas, and details and descriptions of equipment to be used for oil handling, including piping.
6. Control Structures and Secondary Containment:
 - a. Furnish details of and descriptions of control measures installed at the Site by CONTRACTOR to prevent spill from reaching navigable waters of the United States and associated shorelines, including secondary containment and diversionary structures.
 - b. For on-shore Sites, one of the following must be used, at minimum: dikes, berms, or retaining walls; curbing; culverts, gutters, or other drainage systems; weirs, booms, or other barriers; spill diversion ponds; retention ponds; or sorbent materials.
 - c. Where appropriate, the SPCC Plan shall clearly demonstrate that containment or diversionary structures or equipment are not practical.
 - d. Include brittle fracture evaluation, where required, for field-constructed above-ground storage containers undergoing repair, alteration, construction, or change in service.
7. Plans for countermeasures to contain, clean up, and mitigate effects of oil spill that reaches navigable waters of the United States or their shorelines, including written commitment of manpower, equipment, and materials to quickly control and remove spilled oil. Include estimation of time required to contain spill after spill occurs.
8. Contact list and telephone numbers for facility response coordinator, National Response Center, cleanup contractors, and all appropriate federal, state, and local authorities having jurisdiction to be contacted in event of spill or discharge.
9. Program for monthly inspections of the Site by CONTRACTOR for SPCC Plan compliance. Advise OWNER in writing of each inspection not less than 72 hours in advance.
10. Measures for Site security relative to oil storage.
11. Procedures for safely handling mobile containers such as totes, drums, and fueling vehicles and construction equipment that remain at the Site.

12. Procedures and schedules for periodic testing of integrity of tanks and containers, and associated piping and valves.
 13. Plans for bulk storage container compliance.
 14. Plans for personnel training and oil spill prevention briefings.
 15. For SPCC Plans that do not follow the format listed in Laws and Regulations, provide cross-reference to requirements of Laws and Regulations, including 40 CFR 112.7.
- B. Obtain acceptance of SPCC Plan by OWNER, for coordination with OWNER's Site-specific SPCC Plan, if any.
- C. SPCC Plan shall be reviewed by CONTRACTOR's professional engineer (when professional engineer is required) and OWNER every five years, as applicable. CONTRACTOR shall perform updates and revisions of the Project's SPCC Plan as necessary and submit same in accordance with the provisions of this Section for submittal and acceptance of initial SPCC Plan.
- D. Post a copy of accepted, certified SPCC Plan in conspicuous location at the Site and furnish copies to OWNER, ENGINEER, other contractors, and Subcontractors as appropriate. All contractors shall comply with SPCC Plan.
- E. In event of violation of SPCC Plan or release of oils attributable to construction operations, CONTRACTOR shall:
1. Immediately issue notifications in accordance with Laws and Regulations, including 40 CFR 110 and 40 CFR 112. When required by Laws and Regulations, report to National Response Center, US Environmental Protection Agency, and other authorities having jurisdiction, if any.
 2. Have spill clean-up performed in accordance with Laws and Regulations, the SPCC Plan, and requirements of authorities having jurisdiction.
 3. Pay fines and civil penalties (or responsible portion thereof) imposed on OWNER by authorities having jurisdiction, and pay costs associated with clean-up of spills.
 4. Should cleanup of spills attributable to CONTRACTOR be necessary, no resulting change in the Contract Price or Contract Times will be allowed. Should CONTRACTOR share responsibility for spill and cleanup with another entity, changes in Contract Price and Contract Times, if any, will be proportionate.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. CONTRACTOR's Professional Engineer:
 - a. When required by Laws and Regulations, engage a licensed, registered professional engineer legally qualified to practice in the jurisdiction where the Site is located and experienced in performing engineering services of the type required.
 - b. Submit qualifications data.

- c. Responsibilities include but are not necessarily limited to:
 - 1) Carefully reviewing Laws and Regulations relative to SPCC.
 - 2) Preparing written requests for clarifications or interpretations of criteria specified in the Contract Documents for submittal to ENGINEER by CONTRACTOR, and obtaining from authorities having jurisdiction clarifications regarding Laws and Regulations as required.
 - 3) Preparing or supervising the preparation of letter-report evaluation of need for SPCC Plan in accordance with the Contract Documents. Evaluation shall include professional engineer's seal or stamp, registration number, and original signature.
 - 4) When SPCC Plan is required, preparing, supervising the preparation of, or reviewing the SPCC Plan (or designated portions thereof when oil storage at the Site will be 10,000 gallons or less) in accordance with the Contract Documents. SPCC Plan (or designated portions thereof) shall include professional engineer's seal or stamp, registration number, and original signature.
 - 5) Periodically re-evaluating the need for SPCC Plan and issuing findings as letter-reports with seal or stamp, license number, and signature. When SPCC Plan is required, periodically evaluating the SPCC Plan and providing recommendations for compliance with Laws and Regulations, in accordance with the Contract Documents.
 - 6) Certifying that:
 - a) it is familiar with the Laws and Regulations, including 40 CFR 112, and
 - b) it has visited, examined, and is familiar with the Site, planned modifications to the Site under the Project as such modifications pertain to SPCC Laws and Regulations, and
 - c) it has performed the evaluations and prepared SPCC Plan in accordance with the Contract Documents, and
 - d) procedures for required testing and inspections have been established, and
 - e) the said evaluations and SPCC Plan are adequate for the Project, and
 - f) the said evaluations and SPECC Plan complies with Laws and Regulations, applicable industry standards, and to prevailing standards of practice.

1.5 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Certifications: With each evaluation letter and SPCC Plan submittal, include certification signed by preparer of submittal that the submittal complies with the Contract Documents and Laws and Regulations. Signature on all certifications shall be original.
 - 2. Evaluations:

- a. Submit letter presenting results of evaluation of whether a SPCC Plan is required for the Project. Submit evaluation not later than fourteen days after the Contract Times commence running, unless longer time is allowed by ENGINEER.
 - b. Submit updated evaluations as required when conditions at the Site change. Submit updated evaluation not later than seven days after the conditions at the Site change, or within seven days of ENGINEER's request, unless longer time is allowed by ENGINEER.
3. SPCC Plan: When SPCC Plan is required:
 - a. Submit jointly to OWNER and ENGINEER. Submit within 14 days of receipt of ENGINEER's acceptance of evaluation submittal.
 - b. Update and resubmit the SPCC Plan, or acceptable SPCC Plan amendments, as required when conditions at the Site change. Submit updated SPCC Plan or amendments not later than seven days after the change in conditions at the Site change giving rise to the SPCC Plan change or amendment, or within seven days of ENGINEER's request, unless longer time is allowed by ENGINEER.
4. SPCC Plan Distribution: When SPCC Plan is required, submit copies of letters transmitting SPCC Plan and amendments (if any) to contractors and Subcontractors working at the Site.
5. Qualifications Statements: CONTRACTOR's professional engineer, when requested by ENGINEER or OWNER.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 41 24

PERMIT REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements relative to permitting requirements of which OWNER and ENGINEER are aware that apply to the Project.
2. CONTRACTOR shall provide labor, materials, equipment, tools, and incidentals shown, specified, and required to obtain required permits and comply with required permits and licenses.
3. Obtain, pay for, and comply with required permits and licenses whether or not indicated in this Section or elsewhere in the Contract Documents.

B. Coordination:

1. Coordinate compliance with permit and license requirements with Work under other Sections and with other contractors, if any, working at the Site.
2. Coordinate with the Progress Schedule the time required to apply for and obtain required permits and licenses. Changes in Contract Times or Contract Price will not be authorized because of timing and costs associated with obtaining permits and licenses required for the Work.

C. Related Sections: In addition to permits and licenses required under this Section, obtain and comply with permits required under the following Sections:

1. Section 01 14 33, Work in Highway Rights-of-Way.
2. Section 01 35 43.13, Environmental Procedures for Hazardous Materials.
3. Section 01 41 26, Storm Water Pollution Prevention Plan and Permit.
4. Section 01 41 27, Earthmoving Permit and Dust Control.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Copy of each of the following permits as applicable to the Contract:
 - a. Building Permits (Town will waive permit fees).
2. Copy of each of the following licenses as applicable to the Contract:
 - a. None.

1.3 MUNICIPAL PERMITS AND LICENSES

A. Permits:

1. Building permit is not required for the Project. No other municipal permits apply to the Project.

B. Licenses:

1. Municipal licenses are not required for the Work under this Project.

1.4 EROSION AND SEDIMENT CONTROL PERMIT

A. Erosion and Sediment Control Permit – General:

1. Coordinate compliance with erosion and sediment control permit with requirements of Section 01 41 26, Storm Water Pollution Prevention Plan and Permit.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 41 26

STORM WATER POLLUTION PREVENTION PLAN AND PERMIT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for compliance with storm water pollution prevention plans (SWPPP) and permit(s) applicable to the Project.
2. CONTRACTOR shall comply with the Project's State Pollutant Discharge Elimination System (SPDES) Permit issued by State of New York. Regarding this permit, CONTRACTOR shall be a co-permittee with OWNER and shall be responsible for providing necessary materials and taking appropriate measures to comply with requirements of the permit and minimize discharge of pollutants in storm water runoff from the Site.
3. Controls – General:
 - a. Prevent discharge of sediment to and erosion from the Site to surface waters, drainage routes, public streets and rights-of-way, and private property, including dewatering operations.
 - b. Prevent trash and demolition and construction debris from leaving the Site via storm water runoff.
 - c. Provide berms, dikes, and other acceptable methods of directing storm water around work areas to drainage routes.
 - d. Prior to starting the Work associated with such discharge, construction-related discharges to publicly owned conveyance or treatment systems shall be approved by owner of system to which the discharge will be directed.
4. Water Quality:
 - a. Do not cause or contribute to a violation of water quality standards, Laws, or Regulations.
 - b. Notify ENGINEER of revisions to the SWPPP necessary to protect receiving water quality and comply with applicable permits. Provide and implement measures to control pollutants in storm water runoff from the Site to prevent:
 - 1) Turbidity increases that will cause a substantial visible contrast to natural conditions.
 - 2) Increase in suspended, colloidal, and settleable solids that would cause sediment deposition or impair receiving water quality and use.
 - 3) Presence of residue from oil and floating substances, visible oil, and globules of grease.
5. CONTRACTOR shall pay civil penalties and other costs incurred by OWNER, including additional engineering, RPR, and inspection services, associated with non-compliance with applicable permits related to storm water discharges associated with construction activity and sediment and erosion controls

associated with the Work. OWNER may deduct as set-offs such amounts from payments due CONTRACTOR.

6. Contract Price includes all material, labor, and other permits and incidental costs related to:
 - a. Preparing SWPPP Revisions and other documents that are CONTRACTOR's responsibility, in accordance with this Section.
 - b. Installing and maintaining structural and non-structural items used in complying with the SWPPP and its revisions.
 - c. Clean-up, disposal, and repairs following wet weather events or spills caused by CONTRACTOR.
 - d. Implementing and maintaining "best management practices", as defined in applicable permits and Laws or Regulations, to comply with requirements that govern storm water discharges at the Site.
5. Inspections of storm water, sediment, and erosion controls as specified.

B. Multiple-prime Contract Projects:

1. General CONTRACTOR is responsible for the Project's SWPPP and for complying with applicable permits for storm water and control of sediment and erosion. General CONTRACTOR shall coordinate with other prime contractors on the Project to update and revise the SWPPP as required by the Contract Documents and Laws or Regulations. Revisions to the SWPPP shall be by General CONTRACTOR.
2. Prime contractors, other than General Contractor, engaging in earthwork, including trenching, stockpiling, and backfilling, shall be co-permittees with OWNER on the storm water permit, and shall comply with the SWPPP and other applicable permits and with requirements for controlling discharges of storm water and sediment, and erosion control requirements associated with their Work. Prime contractors engaging in earthwork shall coordinate their earthwork with General Contractor on a daily basis, and submit to ENGINEER complete Notice of Termination documents.

C. Documents: The following are part of the Work included under this Section:

1. Storm Water Pollution Prevention Plan (SWPPP):
 - a. Prepared by OWNER and filed with authorities having jurisdiction over storm water discharges during construction. The SWPPP is part of the Contract Documents.
2. Sediment and Erosion Control Permit:
 - a. Prepared by OWNER and filed with the authority having jurisdiction over sediment and erosion control during construction. Sediment and erosion control permit is part of the Contract Documents.
3. SWPPP Revisions:
 - a. Prepared by CONTRACTOR and submitted to ENGINEER.
 - b. CONTRACTOR shall file a SWPPP Revision prior to starting Work at the Site, and as required by authorities having jurisdiction.
 - c. SWPPP Revision shall include CONTRACTOR's proposed temporary means for storm water control during all phases of the Work and include plans for storm water conveyance and retention, as applicable.

Coordinate with excavation plan submittals required in Division 31 of the Specifications.

- d. Should CONTRACTOR-propose deviations to the SWPPP included in the Contract Documents, or if Project-specific modifications of the SWPPP are required because of field conditions, CONTRACTOR shall prepare and submit additional SWPPP Revisions as necessary, in accordance with requirements of authorities having jurisdiction and applicable permits.
 - e. Comply with Article 1.4 of this Section.
 - f. SWPPP Revisions shall use the SWPPP Revision form included in this Section, with supporting documents attached as required, or forms provided by authorities having jurisdiction.
 - g. SWPPP Revisions that do not comply with the Contract Documents and are not required by authorities having jurisdiction will be regarded as substitutions, in accordance with the General Conditions and substitution procedures in the Specifications.
4. Storm Water Certification Statement:
- a. To be prepared by CONTRACTOR and submitted to ENGINEER on the form included with this Section, or on a form provided by authority having jurisdiction.
 - b. Do not perform Work at the Site until the Storm Water Certification has been submitted to and accepted by ENGINEER.
5. Notice of Intent (NOI):
- a. Prepared by OWNER or ENGINEER and submitted to authorities having jurisdiction following ENGINEER's receipt and acceptance of CONTRACTOR's SWPPP Revision and preliminary Progress Schedule.
 - b. NOI will be filed with authorities having jurisdiction by ENGINEER within ten days of ENGINEER's acceptance of CONTRACTOR's SWPPP Revision and preliminary Progress Schedule.
 - c. Do not perform Work at Site until NOI is submitted to authorities having jurisdiction.
6. Co-permittee Agreement:
- a. Prepared by CONTRACTOR using forms included with the SWPPP, and submitted to ENGINEER within five days of the date the Contract Times commence running, for signature by OWNER.
 - b. ENGINEER will file co-permittee agreement with authorities having jurisdiction.
 - c. Do not perform Work at the Site until co-permittee agreement is submitted to authorities having jurisdiction.
7. Storm Water Inspection Report:
- a. Prepared by ENGINEER's Resident Project Representative (RPR) using the form included with this Section, or a form provided by authority having jurisdiction.
 - b. Storm water inspection reports will be filed in a log book kept at the Site by RPR. Copy of each report will be furnished to CONTRACTOR upon request.

- c. Storm water inspection report will be completed for each of the following:
 - 1) Pre-construction: After placement of storm water management measures, including sediment and erosion controls, and temporary field offices and other temporary facilities, prior to starting other Work at the Site.
 - 2) During the Work: Every seven days until Notice of Termination is completed. When the Site is stabilized relative to storm water, erosion, and discharge of sediment, inspection frequency during temporary shutdowns and seasonal shutdowns is once per month until Notice of Termination is completed.
 - 3) Final: Final inspection report will be prepared prior to completion of Notice of Termination.
 - 8. Notice of Termination (NOT):
 - a. Prepared by CONTRACTOR on the form included with storm water permit and submitted to ENGINEER for review and signature by OWNER.
 - b. ENGINEER will submit the NOT to authority having jurisdiction.
 - c. CONTRACTOR shall submit the NOT following completion of all Work that may result in pollution in storm water discharges, including landscaping Work.
 - d. Final Payment will not be made until the NOT is filed with authority having jurisdiction.
- D. Coordination:
- 1. Coordinate requirements of this Section with requirements for earthwork, erosion control, and landscaping in the Contract Documents, applicable permit requirements, and Laws and Regulations.
 - 2. Implement SWPPP controls and practices prior to starting other Work at the Site. Each prime contractor and Subcontractor identified in the SWPPP and SWPPP Revisions shall sign a copy of the storm water certification statement.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with Laws and Regulations relative to environmental protection and restoration, including:
- 1. Storm water permit applicable to the Work and Site.
 - 2. State and local erosion and sediment control guidelines and requirements,
 - 3. State and local storm water regulations and guidance.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
- 1. Submit the following, in accordance with Paragraph 1.1.C and Article 1.4 of this Section. When the Project involves Work at multiple sites, submit each of the following for each Site, as applicable:
 - a. SWPPP Revisions.

- b. Co-permittee Agreement.
 - c. Storm Water Certification Statement.
 - d. Notice of Termination
- 2. Approval to Discharge to Publicly-owned Treatment Works:
 - a. For storm water discharges associated with construction activity that are discharged to a publicly owned conveyance or treatment system, prior to commencing discharges, submit system owner's written approval for such discharges.
- 3. Storm Water Site Plan Updates:
 - a. Within three days after each storm water inspection, submit updated storm water site plan.

1.4 SWPPP REVISIONS

- A. CONTRACTOR shall prepare a SWPPP Revision in accordance with the Project's storm water permit when:
 - 1. There is a significant change in design, construction, operation, or maintenance of the Project that significantly affects the potential of discharging pollutants to Waters of the United States, and has not otherwise been addressed in the SWPPP.
 - 2. SWPPP proves to be ineffective relative to:
 - a. eliminating or significantly minimizing pollutants from sources identified in the SWPPP required by the Project's storm water permit, or
 - b. achieving general objectives of controlling pollutants in storm water discharges from permitted construction activity.
 - 3. Prepare and submit SWPPP Revision identifying prime contractors and Subcontractor responsible for implementing part of the SWPPP.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 INSPECTIONS AND REPAIRS

- A. Perform Site inspections and assessments as required in applicable storm water permit and this Section. Inspections and assessments shall be done by CONTRACTOR's site superintendent or project manager, together with ENGINEER's RPR.
- B. Inspections:
 - 1. During the Work, relative to the storm water permit, inspections of the Site shall be performed:
 - a. Pre-Construction: After SWPPP controls are provided and prior to starting other Work at the Site.

- b. During the Work: Every seven days until Notice of Termination is completed and submitted to authority having jurisdiction. When the Site is stabilized relative to storm water, erosion, and discharge of sediment, inspection required frequency during temporary shutdowns and seasonal shutdowns is not less than once per month until Notice of Termination is completed.
 - c. Prior to CONTRACTOR submitting the Notice of Termination.
 - 2. During each inspection, verify sediment control practices and record the approximate degree of sediment accumulation as percentage of acceptable sediment storage volume; inspect erosion and sediment control practices and record maintenance performed; observe and record deficiencies relative to implementation of the SWPPP. RPR or ENGINEER will complete Storm Water Inspection Reports and CONTRACTOR shall record and submit the following.
 - a. Storm Water Site Plan: On a copy of the Site plan included in the Contract Documents or other map of the Site acceptable to ENGINEER, indicate extent of all disturbed areas and drainage pathways. Indicate areas expected to undergo initial disturbance or significant site work within the next fourteen days.
 - b. Indicate on storm water site plan areas of Site that have undergone temporary or permanent stabilization.
 - c. Indicate on storm water site plan all disturbed areas that have not undergone active site Work during the previous 14 days.
- C. Maintain at the Site a copy of storm water site plans from each storm water inspection and submit each storm water site plan to ENGINEER and RPR. RPR will maintain at the Site a log book with a copy of each Storm Water Inspection Report.
- D. Cooperate with representatives of authorities having jurisdiction during their periodic visits to the Site, and promptly furnish information requested by authorities having jurisdiction.
- E. Perform repairs to SWPPP controls, in accordance with applicable requirements and to satisfaction of ENGINEER, within two days of each inspection.

3.2 ATTACHMENTS

- A. The documents listed below, following this Section's "End of Section" designation, are part of this Specifications Section. Notice of Intent (NOI) form, Co-permittee Agreement form, and Notice of Termination (NOT) form are included with storm water permit.
 - 1. Storm Water Inspection Report form (two pages).
 - 2. Storm Water Permit Certification form (one page).
 - 3. SWPPP Revision Form (one page).

+ + END OF SECTION + +

STORM WATER INSPECTION REPORT

Owner: Site: Project: Contractor:
--

Date of Inspection: _____

Day of Week:

S	M	T	W	T	F	S
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Sheet No. _____ of _____ Sheets

If pertinent to the Operation	
Weather	
Temperature	

This inspection and maintenance form is to be used when the Work is subject to a Storm Water General Permit for Construction Activity. Inspections shall be performed not less than once every seven calendar days; for sites that are stabilized and temporarily shut down inspections may be reduced to once per month. Each erosion and sediment control measure installed on the Site is to be inspected and the Contractor must complete all required maintenance within two calendar days from the date of inspection.

- Reason for this inspection:**
- ☐ Pre-construction Site assessment
 - ☐ Seven calendar day inspection
 - ☐ Monthly inspection (when Site is stabilized and shut down)
 - ☐ Post-construction inspection prior to Notice of Termination

Key for erosion and sediment control measures to be inspected: [Use the following designations in the table below] (1) mulch, (2) seed and mulch, (3) check dams, (4) hay bale/straw bales, (5) silt fence, (6) sediment trap, (7) turbidity curtains, (8) pipe slope drains, (9) drainage structure inlet protection, (10) rolled erosion control products, (11) soil stabilizers, (12) construction entrances, (13) pipe inlet/outlet protection, (14) water diversion structures, (15) sedimentation basins, (16) cofferdams, (17) Other _____.

ID	Location	Disturbance		Measure		Remarks (Evaluate integrity of measure, describe evidence of erosion)	Approximate Sediment Accumulation (% of Depth)	Maintenance Required? (Y or N) (If Yes, Describe Below)
		Existing? (Y or N)	Next 14 Days? (Y or N)	Code #	Temp or Perm? (T, P or NA)			
1								
2								
3								
4								
5								
6								
7								
8								

ID	Location	Disturbance		Measure		Remarks (Evaluate integrity of measure, describe evidence of erosion)	Approximate Sediment Accumulation (% of Depth)	Maintenance Required? (Y or N) (If Yes, Describe Below)
		Existing? (Y or N)	Next 14 Days? (Y or N)	Code #	Temp/Perm or N/A? (T, P or NA)			
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

DESCRIPTION OF REQUIRED MAINTENANCE AND ANY EXISTING DEFICIENCIES IN THE SWPPP:
Specify for each location using row ID number.

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein may be punishable by Law.

Signature: _____ Prepared: _____ Copy to Contractor: _____
Resident Project Representative (Date) (Date)

Qualified Professional Name _____
(w/Firm Name, if Consultant)

STORM WATER PERMIT CERTIFICATION

Contract Number: _____ Project: _____

Owner: _____

Each Contractor and Subcontractor identified in the Storm Water Pollution Prevention Plan (SWPPP) must certify that they understand the permit conditions and their responsibilities. Every Contractor and Subcontractor performing an activity that involves soil disturbance shall sign this certification and submit it to the Engineer prior to performing the Work. This certification shall be signed by an owner, principal, president, secretary, or treasurer of the firm.

I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction Site identified in such SWPPP as a condition of authorization to discharge storm water. I also understand that my firm and its employees and Subcontractors shall comply with the terms and conditions of Owner's general permit for storm water discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards, Laws, or Regulations.

Firm: _____

Address: _____

City: _____ State _____ Zip _____

Name (Print)

Signature

Date

Title

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REVISION

Owner:
Site:
Project:
Contractor:

Date of Inspection: _____

Sheet No. _____ of _____ Sheets

This form shall be used when revisions to the current Storm Water Pollution Prevention Plan (SWPPP) are required by the Storm Water General Permit for Construction Activity or the Contract Documents.

Reason for the Revision(s): Revisions were requested by State: ☐ Yes ☐ No

Describe the Revision(s) to the SWPPP: _____

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein may be punishable by Law.

Signature: _____ Prepared: _____ Submitted: _____

(Date)

(Date)

Copy to: ☐ Engineer ☐ Contractor _____

SECTION 01 41 27

EARTHMOVING PERMIT AND DUST CONTROL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for controlling fugitive dust emissions resulting from construction activities, including earthmoving, in coordination with Laws and Regulations.
2. CONTRACTOR shall obtain, pay for, and comply with permits required for earthmoving and dust control required because of dust-generating operations related to the Work, and shall develop and comply with provisions of dust control plan.
3. Provide necessary labor, materials, equipment, tools, services, and incidentals to: apply sufficient dust suppressants; properly clean all track-out areas to driveways, roadways, and highways; and provide adequate physical stabilizations of soils to comply with earthmoving permits and accepted dust control plan.
4. Control fugitive dust generation from CONTRACTOR's operations including the following:
 - a. Construction areas.
 - b. Vehicle and equipment parking areas.
 - c. Material and equipment storage areas.
 - d. Field office area(s) and staging areas.
 - e. Haul and access roadways.
 - f. Track-out areas.
 - g. Other areas where CONTRACTOR will work, store materials or equipment, or park vehicles and equipment.
5. Do not cause or allow dust-generating operations, earthmoving operations, use of property, or other operations that result in fugitive dust emissions that exceed limits prescribed by authorities having jurisdiction.
6. Pay fines and civil penalties incurred by OWNER because of CONTRACTOR's actions or violations of earthmoving permits and dust control plan. OWNER may deduct as set-offs such amounts from payments due CONTRACTOR.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

- 1 Dust Control Plan:
 - a. Prepare and submit to ENGINEER and OWNER in accordance with Article 1.4 of this Section. Submit within the earlier of 30 days after

the Contract Times commence running or prior to commencing earth-disturbing operations at the Site.

2. Earthmoving Permit:
 - a. Submit copy of permits obtained from authorities having jurisdiction, within seven days of CONTRACTOR's receipt of such permits. Do not commence earthmoving operations at the Site until required permits are obtained and submitted to ENGINEER.
3. Daily Logs and Reasonably-Available Control Measures (RACM) Records:
 - a. Submit upon request of OWNER or ENGINEER.
4. Field Quality Control Submittals:
 - a. When opacity monitoring is required, submit results not later than two days following completion of observations.

1.3 POSTING AND RECORDKEEPING

- A. Post copy of earthmoving permit and accepted dust control plan at conspicuous location at the Site.
- B. Recordkeeping:
 1. Maintain daily written log to record the actual application or implementation of reasonably-available control measures (RACM) described in the accepted dust control plan.
 2. Maintain the written log and supporting documentation at the Site, and submit copies to ENGINEER or OWNER upon request.
 3. Retain copies of dust control plan, RACM implementation records, and supporting documentations for not less than three years after Substantial Completion of the entire Project.

1.4 DUST CONTROL PLAN

- A. Prepare and submit to ENGINEER and OWNER a dust control plan that includes the following:
 1. Names, address, office and cellular telephone numbers, and e-mail address of person(s) responsible for preparing and overseeing implementation of dust control plan. Designate one person responsible for overseeing implementation of dust control plan for the Project.
 2. Name(s), address(es), office and cellular telephone numbers, and e-mail addresses of person(s) responsible for dust generating operations.
 3. Site plan delineating total area of land surface to be disturbed. Delineate each area of phased disturbances, when applicable.
 4. Total disturbed area in acres; earthmoving and dust-generating operations and activities to be performed at the Site; actual and potential sources of fugitive dust emissions; and delivery, transportation, and storage areas for the Site, including types of materials stored and appropriate size of material stockpiles.

5. Description of reasonably-available control measures (RACM) to be implemented during dust-generating operations at actual and potential sources of fugitive dust.
6. Description of dust suppressants to be used including product data and material safety data sheets (MSDS); method, frequency, and intensity of application; type, number, and capacity of application equipment; and certifications related to the suppressant's appropriate and safe use.
7. Description of specific surface treatment(s) or RACM proposed for controlling material deposition along paved surfaces (e.g., "track-out" areas) where unpaved Site surfaces or Site access points meet paved surfaces.
8. As contingency measure, designate and include description of not less than one alternative RACM for each actual and potential fugitive dust source.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Testing and Monitoring.
 1. Upon direction of OWNER or ENGINEER, obtain opacity observations for visible emissions of fugitive dust.
 2. Opacity Monitoring Method:
 - a. USEPA Method 9, Visual Determination of Opacity of Emissions from Stationary Sources (Emission Measurement Technical Information Center Test Method 009).
 3. Location and Frequency of Opacity Observations:
 - a. Obtain opacity observations from not less than six locations at downwind perimeter of the Site during construction operations.
 - b. Perform opacity monitoring at frequency required by applicable earthmoving/dust control permit, unless more-frequent monitoring is required by OWNER or ENGINEER.
 4. Qualifications: Opacity monitoring observations shall be by person trained and experienced with the opacity monitoring method specified.
 5. Prepare and submit to ENGINEER written report of results of opacity monitoring and observations.
 6. No additional compensation or addition to the Contract Times will be authorized for opacity observations.

+ + END OF SECTION + +

SECTION 01 42 00

REFERENCES

PART 1 – GENERAL

1.1 DEFINITIONS

- A. Definitions and terminology applicable to all the Contract Documents are included in the Information for Bidders and General Conditions and Supplemental Conditions.
- B. Terminology used in the Specifications includes:
 - 1. “Indicated” refers to graphic representations, notes, or schedules on the Drawings, or to other paragraphs or schedules in the Specifications and similar locations in the Contract Documents. Terminology such as “shown”, “noted”, “scheduled”, and “specified” are used to help the user locate the reference without limitation on the location.
 - 2. “Installer”, “applicator”, or “erector” is Contractor or another entity engaged by Contractor, either as an employee or Subcontractor, to perform a particular construction activity, including installation, erection, application or similar Work. Installers shall be experienced in the Work that installer is engaged to perform.
 - a. The term “experienced”, when used with the term “installer”, means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; being familiar with Laws and Regulations; and having complied with requirements of authorities having jurisdiction, and complying with requirements of the Supplier of the material or equipment being installed.
 - 3. Trades: Use of a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter”, unless otherwise indicated in the Contract Documents or required by Laws or Regulations. Such terminology also does not imply that specified requirements apply exclusively to trade personnel of the corresponding generic name.

1.2 APPLICABLE CODES

- A. References in the Contract Documents to local code(s) shall mean the following:
 - 1. City of Mount Vernon, New York Codes.
 - 2. County of Westchester, New York Codes.
 - 3. State of New York Codes.
 - 4. National Electric Code.
 - 5. NFPA 101, Life Safety Code.

1.3 ABBREVIATIONS

- A. Common abbreviations that may be found in the Contract Documents are listed below, alphabetically by their written-out meaning:

alternating current	a-c
Ampere	A
Architectural Barriers Act	ABA
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
ante meridian	a.m.
Average	avg
biochemical oxygen demand	BOD
brake horsepower	bhp
British thermal unit	Btu
Centigrade (or Celsius)	C
chlorinated polyvinyl chloride	CPVC
chlorofluorocarbons	CFC
Code of Federal Regulations	CFR
cubic inch	cu in
cubic foot	cu ft
cubic yard	cu yd, or CY
cubic feet per minute	cfm
cubic feet per second	cfs
Decibel	db
degree Centigrade (or Celsius) (Write)	degrees C or °C
degrees Fahrenheit	degrees F or °F
Diameter	dia
direct current	d-c
Dollars	\$
Each	ea
Efficiency	eff
Fahrenheit	F
Feet	ft
feet per hour	fph
feet per minute	fpm
feet per second	fps

Figure	Fig
Flange	flg
foot-pound	ft-lb
Gallon	gal
gallons per hour	gph
gallons per minute	gpm
gallons per second	gps
gram	g
grams per liter	g/L
Hertz	Hz
horsepower	hp or HP
Hour	hr
human-machine interface	HMI
Inch	in.
inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID
iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi
kilovolt-ampere	kva
Kilowatt	kw
kilowatt-hour	kwhr or kwh
linear foot	lin ft or LF
liter	L
Leadership in Energy and Environmental Design(USGBC)	LEED
Maximum	max
Mercury	Hg
Milligram	mg
milligrams per liter	mg/l or mg/L
Milliliter	ml
millimeter	mm
million gallons per day	mgd or MGD
million gallon	MG
Minimum	min
national pipe threads	NPT

net positive suction head	NPSH
net positive suction head available	NPSHA
net positive suction head required	NPSHR
nitrogen oxide (total concentration of mono-nitrogen oxides such as nitric oxide (NO) and nitrogen dioxide (NO ₂))	NO _x
nominal pipe size	NPS
Number	no.
operator interface terminal	OIT
Ounce	oz
ounce-force	ozf
outside diameter	OD
parts per hundred	pph
parts per million	ppm
parts per billion	ppb
polyvinyl chloride	PVC
post meridian	p.m.
Pound	lb
pounds per square inch	psi
pounds per square inch absolute	psia
pounds per square inch gauge	psig
pounds per square foot	psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	rpm
Second	sec
specific gravity	sp gr, or SG
Square	sq
square foot	sq ft, or sf
square inch	sq in.
square yard	sq yd, or SY
Standard	std
standard cubic feet per minute	scfm
total dynamic head	TDH
totally-enclosed fan-cooled	TEFC
Volt	V
volts alternating current	vac

volts direct current
volatile organic compounds

vdc
VOC

1.4 REFERENCE STANDARDS

A. Standards, Specifications, Codes, Laws, and Regulations:

1. Provisions of reference standards are in effect in accordance with the Specifications. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

B. Reporting Discrepancies:

1. Contractor's Review of Contract Documents Before Starting Work: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. Contractor's Review of Contract Documents During Performance of Work: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required) until an amendment or supplement to the Contract Documents has been issued.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonable should have known thereof.

C. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. The provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. The provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).
- D. Copies of Standards: Each entity engaged in the Work shall be familiar with reference standards applicable to its construction activity. Copies of applicable reference standards are not bound with the Contract Documents. Where reference standards are needed for a construction activity, obtain copies of standards from the publication source.
- E. Abbreviations and Names: Where reference standards, specifications, codes, manuals, Laws or Regulations, or other published data of international, national, regional or local organizations are referred to in the Contract Documents, the organization issuing the standard may be referred to by their acronym or abbreviation only. Following acronyms or abbreviations that may appear in the Contract Documents shall have the meanings indicated below. Listing is alphabetical by acronym.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
EJCDC	Engineers Joint Contract Documents Committee
NEC	National Electric Code
OSHA	Occupational Safety and Health Administration

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 45 29.13

TESTING LABORATORY SERVICES FURNISHED BY CONTRACTOR

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall employ and pay for services of independent testing laboratory to perform specified services.
 2. Inspection, sampling, and testing shall be as specified in the Specifications including but not limited to:
 - a. Section 03 00 05, Concrete.
 - b. Section 04 00 05, Masonry.
 - c. Section 05 05 33, Anchor Systems.
 - d. Section 09 91 00, Painting.
 - e. Section 32 12 00, Flexible Paving.
 - f. Section 33 05 05, Buried Piping Installation.
 - g. Other tests indicated in the Contract Documents that are not specifically assigned to others.
 3. CONTRACTOR shall pay for:
 - a. Tests not specifically indicated in the Contract Documents as being OWNER's responsibility.
 - b. Tests made for CONTRACTOR's convenience.
 - c. Repeat tests required because of CONTRACTOR's negligence or defective Work, and retesting after failure of test for the same item to comply with the Contract Documents.
 4. Testing laboratory is not authorized to approve or accept any portion of the Work or defective Work; rescind, alter, or augment requirements of Contract Documents; and perform duties of CONTRACTOR.

1.2 REFERENCES

- A. Standards referenced in this Section are:
1. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
 2. ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories.
 3. NIST SRM, Standard Reference Materials.

1.3 QUALITY ASSURANCE

- A. Qualifications:
1. Testing Laboratory:
 - a. Comply with applicable requirements of ASTM E329.

- b. Testing laboratory shall be licensed to operate in the same jurisdiction as the Site. Where applicable, laboratory shall be certified by the authority having jurisdiction for the types of testing required.
- c. Testing equipment used by laboratory shall be calibrated at intervals of not more than twelve months by devices of accuracy traceable to one of the following: NIST SRM, ISO/IEC 17025, certified by state or local bureau of weights and measures, or values of natural physical constants generally accepted in the engineering and scientific community.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Quality Control Submittals and Test Reports: Testing laboratory shall promptly submit to CONTRACTOR results of testing and inspections, including:
 - a. Date issued.
 - b. Project title, number, and name of the Site.
 - c. Testing laboratory name and address.
 - d. Name and signature of inspector or person obtaining samples.
 - e. Date of inspection or sampling.
 - f. Record of temperature and weather conditions.
 - g. Date of test.
 - h. Identification of material or item tested, and associated Specifications Section.
 - i. Location in the Project.
 - j. Type of inspection or test.
 - k. Results of tests and observations regarding compliance with the Contract Documents.
 - 2. Qualifications Statements:
 - a. Testing Laboratory:
 - 1) Qualifications statement indicating experience and facilities for tests required under the Contract Documents.
 - 2) Copy of report of inspection of facilities during most recent NIST inspection tour. Include memorandum of remedies of deficiencies reported during inspection.
 - 3) Copy of certificate of calibration for each instrument or measuring device proposed for use, by accredited calibration agency.

1.5 TESTING LABORATORY DUTIES

- A. Testing laboratory shall:
 - 1. Cooperate with CONTRACTOR and provide qualified personnel promptly on notice.
 - 2. Perform required inspections, sampling, and testing of materials and methods of construction; comply with applicable reference standards and the Contract Documents; and ascertain compliance with requirements of the Contract Documents.

3. Promptly notify ENGINEER and CONTRACTOR of irregularities or deficiencies in the Work that are observed during performance of services.
4. Promptly submit to CONTRACTOR reports of inspections and tests.
5. Perform additional tests and services, as required by CONTRACTOR.

1.6 CONTRACTOR'S RESPONSIBILITIES

A. CONTRACTOR shall:

1. Cooperate with testing laboratory personnel.
2. Provide to testing laboratory preliminary representative samples of materials and items to be tested, in required quantities.
3. Promptly submit to ENGINEER results of tests and inspections received from testing laboratory.
4. Furnish to laboratory the preliminary design mix proposed for concrete and other material mixes to be tested by testing laboratory.
5. Provide labor and facilities:
 - a. For access to the Work to be tested, and where required, to Suppliers' operations.
 - b. For obtaining and handling samples at the Site.
 - c. For facilitating inspections and tests.
 - d. For testing laboratory's exclusive use for storing and curing of test samples.
 - e. Forms for preparing concrete test beams and cylinders.
6. Notify laboratory and ENGINEER sufficiently in advance of operations to allow assignment of personnel and scheduling of tests.
7. Arrange with laboratory and pay for additional services, sampling, and testing required for CONTRACTOR's convenience.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 45 29.23

TESTING LABORATORY SERVICES FURNISHED BY OWNER

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. OWNER will employ and pay for an independent testing laboratory to perform specified services. Testing laboratory selected will be subject to ENGINEER's acceptance.
2. Inspection, sampling, and testing shall be as specified in the Specifications including but not limited to:
 - a. Section 01 45 33, Code-Required Special Inspections and Procedures.
 - b. Other tests in the Contract Documents that are not specifically assigned to others.
3. CONTRACTOR shall pay for:
 - a. Tests not specifically indicated in the Contract Documents as being OWNER's responsibility.
 - b. Tests made for CONTRACTOR's convenience.
 - c. Repeat tests required because of CONTRACTOR's negligence or defective Work
 - d. Tests required after failure of two or more of the same test for the same item to comply with the Contract Documents, for tests initially paid for by OWNER.
4. Testing laboratory is not authorized to approve or accept any portion of the Work or defective Work; rescind, alter, or augment requirements of Contract Documents; and perform duties of CONTRACTOR.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
2. ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories.
3. NIST SRM, Standard Reference Materials.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory:
 - a. Testing laboratory will comply with applicable requirements of ASTM E329.

- b. Testing laboratory will be authorized to operate in the same jurisdiction as the Site. Where applicable, laboratory will be certified by the authority having jurisdiction for the types of testing required.
- c. Testing equipment used by laboratory will be calibrated at intervals of not more than twelve months by devices of accuracy traceable to one of the following: NIST SRM, ISO/IEC 17025, certified by state or local bureau of weights and measures, or values of natural physical constants generally accepted in the engineering and scientific community.

1.4 SUBMITTALS

- A. Informational Submittals: Testing laboratory will submit the following:
 - 1. Quality Control Submittals and Test Reports: Promptly submit to ENGINEER and CONTRACTOR results of testing and inspections, in accordance with Section 01 33 00, Submittal Procedures, including:
 - a. Date issued.
 - b. Project title, number, and name of the Site.
 - c. Testing laboratory name and address.
 - d. Name and signature of inspector or person obtaining samples.
 - e. Date of inspection or sampling.
 - f. Record of temperature and weather.
 - g. Date of test.
 - h. Identification of material or item tested, and associated Specifications Section.
 - i. Location in the Project.
 - j. Type of inspection or test.
 - k. Results of tests and observations regarding compliance with the Contract Documents.
 - 2. Qualifications Statements: Upon CONTRACTOR's request, testing laboratory will submit the following:
 - a. Testing Laboratory:
 - 1) Qualifications statement indicating experience and facilities for tests required under the Contract Documents.
 - 2) Copy of report of inspection of facilities during most recent NIST inspection tour. Include memorandum of remedies of deficiencies reported during inspection.
 - 3) Copy of certificate of calibration for each instrument or measuring device proposed for use, by accredited calibration agency.

1.5 TESTING LABORATORY DUTIES

- A. OWNER-hired testing laboratory will:
 - 1. Cooperate with CONTRACTOR and ENGINEER and provide qualified personnel promptly when notified.
 - 2. Perform required inspections, sampling, and testing of materials and methods of construction; comply with applicable reference standards and the Contract

- Documents; and ascertain compliance with requirements of the Contract Documents.
3. Promptly advise ENGINEER and CONTRACTOR in writing of irregularities and deficiencies in the Work observed during performance of services.
 4. Submit to ENGINEER and CONTRACTOR written reports of inspections and tests required by the Contract Documents.
 5. Perform additional tests and services as required by OWNER or ENGINEER to verify compliance with the Contract Documents.

1.6 CONTRACTOR'S COORDINATION WITH TESTING LABORATORY

- A. CONTRACTOR shall perform and provide the following relative to OWNER-hired testing laboratory:
 1. Provide to testing laboratory representative samples of materials to be tested, in required quantities.
 2. Provide labor and facilities:
 - a. For access to the Work to be tested, and where required, to Suppliers' operations.
 - b. For obtaining and handling samples at the Site.
 - c. For facilitating inspections and tests.
 - d. For laboratory's exclusive use for storing and curing of test samples.
 - e. Forms for preparing concrete test beams and cylinders.
 3. Notify testing laboratory and ENGINEER sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.
 4. Arrange with testing laboratory and pay for additional services, sampling, and testing required for CONTRACTOR's convenience.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 45 33.00

CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope
 - 1. CONTRACTOR shall provide labor, materials, tools, equipment, and incidentals as shown, specified, and required to cooperate with the Coordinating Special Inspector, individual special inspectors, and testing agencies employed by OWNER, to facilitate Special Inspections.
 - 2. Drawing S-03, Statement of Special Inspections, lists testing and inspections required.

1.2 DEFINITIONS

- A. Coordinating Special Inspector: Professional engineer or architect, hired by OWNER, registered in the same state as the Site, responsible for coordinating and verifying the inspection and testing required by the Statement of Special Inspections included in this Section and reporting to the Building Official.
- B. Building Official: Officer or other designated authority having jurisdiction charged with the administration and enforcement of the governing building code, or a duly authorized representative.
- C. Special Inspections: Testing and inspection required in Supplement A, Statement of Special Inspections, of this Section.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. OWNER will employ and pay for services of the Coordinating Special Inspector, who will have not less than five years of experience in managing, monitoring, and inspecting building construction.
 - 2. Inspectors will be qualified in the responsibilities of the Special Inspection for which each is responsible.
- B. Regulatory Requirements:
 - 1. Special Inspections will be in accordance with applicable building code and other Laws and Regulations, and Statement of Special Inspections.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Samples: Representative Samples of materials when required by ENGINEER.

- B. Informational Submittals: Submit the following:
 - 1. Completed Supplement B, Contractor's Statement of Responsibility, as attached to this Section, addressing each system and component listed in the Quality Assurance Plan portion of Statement of Special Inspections.
 - 2. Completed Supplement C, Fabricator's Certificate of Compliance, as attached to this Section, for fabrication of structural steel.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Prepare Supplement B, Contractor's Statement of Responsibility, of this Section which shall include:
 - 1. Acknowledgment of the requirements of the Quality Assurance Plan portion of Statement of Special Inspections.
 - 2. Acknowledgment that necessary quality control shall be exercised in fabricating, handling, and installing, to comply with the Contract Documents.
 - 3. List CONTRACTOR's procedures for ensuring the quality of the Work necessary for compliance with the Contract Documents relative to each system or component listed in the Quality Assurance Plan portion of Statement of Special Inspections.
 - 4. List personnel who control the quality of the Work relative to the Contract Documents and indicate their position in the CONTRACTOR's organization.
- B. Provide safe access to the Work to be tested and inspected.
- C. Provide assistance in obtaining and handling test samples at the Site.
- D. Facilitate inspections and tests.
- E. Provide access to Suppliers' and Subcontractors' operations as required.
- F. Notify Coordinating Special Inspector and ENGINEER sufficiently in advance of the Work for the Coordinating Special Inspector and ENGINEER to coordinate their personnel at the Site. Do not cover the Work to be inspected until Special Inspection has been completed and the results thereof are acceptable.
- G. Special Inspections required in this Section do not supersede or make unnecessary inspections and tests required under other Specification Sections or standard inspections required by Laws and Regulations.

1.6 COORDINATING SPECIAL INSPECTOR'S RESPONSIBILITIES

- A. Coordinating Special Inspector will:
 - 1. Complete Statement of Special Inspections to provide names of each inspector and testing agency for each Special Inspection required
 - 2. Engage services of inspectors and testing agencies for Special Inspections in accordance with Statement of Special Inspections and as required by Laws and Regulations.

3. Coordinate activities of individual inspectors and testing agencies with CONTRACTOR.
4. Provide interim reports of inspections and material testing to Building Official, OWNER, ENGINEER, and ENGINEER's consultants, including structural engineer and architect.
5. To obtain certificate of use and occupancy from the Building Official, complete and provide to the Building Official, OWNER, and ENGINEER Supplement A, Final Report of Special Inspections, of this Section, documenting completion of Special Inspections and correction of discrepancies noted in the Special Inspections.

1.7 INSPECTOR RESPONSIBILITIES

- A. Perform specified inspections, sampling, and testing of materials and methods of construction; review and ascertain compliance with Laws and Regulations.
- B. Promptly notify Coordinating Special Inspector, OWNER, ENGINEER and CONTRACTOR of irregularities or deficiencies in the Work observed during Special Inspections. Corrective action, if required, will be determined by ENGINEER.
- C. Promptly submit two copies of each report of inspections and tests to Coordinating Special Inspector, ENGINEER, and CONTRACTOR including:
 1. Date issued.
 2. Project title and number.
 3. Name and signature of inspector.
 4. Date of inspection or sampling and test.
 5. Record of temperature and weather.
 6. Identification of product and Specification Section.
 7. Location in Project.
 8. Type of inspection or test.
 9. Results of inspections and tests, and observations regarding compliance with Laws and Regulations, and standards.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SUPPLEMENTS

- A. The supplements listed below, following the “End of Section” designation, are part of this Section:
 1. Supplement A – Final Report of Special Inspections
 2. Supplement B – Contractor's Statement of Responsibility
 3. Supplement C – Fabricator's Certificate of Compliance

+ + END OF SECTION + +

Supplement A - Final Report of Special Inspections

Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

(Type or print name)

Signature

Date

Licensed Professional Seal

Agent's Final Report

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Agent of the Special Inspector

(Type or print name)

Signature

Date

*Licensed Professional Seal or
Certification*

Supplement B - Contractor's Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated in the Quality Assurance Plan of Supplement A shall submit a Contractor's Statement of Responsibility.

Project:

Contractor's Name:

Address:

License No.:

Description of designated building systems and components included in the Contractor's Statement of Responsibility:

Contractor's Acknowledgment of Special Requirements

I hereby acknowledge that I have received, read, and understand the Project's seismic requirements, Quality Assurance Plan in Supplement A, and Special Inspection program.

I hereby acknowledge that control will be exercised to obtain conformance with the Contract Documents approved by the Building Official having jurisdiction.

Signature

Date

Contractor's Provisions for Quality Control

Procedures for exercising control within the Contractor's organization, the method and frequency of reporting and the distribution of reports are attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement.

Supplement C - Fabricator's Certificate of Compliance

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project:

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the Contract Documents.

Signature

Date

Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual.

SECTION 01 51 05

TEMPORARY UTILITIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. General CONTRACTOR shall provide all temporary utilities and temporary facilities required for the Project, including the following:
 - a. Electricity.
 - b. Lighting.
 - c. Telephone and communications.
 - d. Heating, cooling, ventilating, and temporary enclosures.
 - e. Water.
 - f. Sanitary facilities.
 - g. First-aid facilities.
 - h. Fire protection.
2. Make all arrangements with utility owners for temporary utilities and with others as appropriate for temporary facilities. Obtain required permits and approvals for temporary utilities and temporary facilities.
3. Pay all service costs for utilities and facilities indicated in this Section as General CONTRACTOR's responsibility, including cost of electricity, water, fuel, and other utility services and temporary facilities required for the Work.
4. Continuously maintain adequate temporary utilities and temporary facilities for all purposes for the Project, until removal of temporary utilities and temporary facilities. At minimum, provide and maintain temporary utilities and temporary facilities through Substantial Completion and removal of temporary field offices and sheds unless otherwise approved in writing by ENGINEER.
5. Should OWNER occupy part of the Work prior to Substantial Completion of the entire Work, cost of utilities consumed via temporary utilities serving the portion occupied by OWNER will be shared proportionately by OWNER and CONTRACTOR as mutually agreed to by the parties.
6. Maintain, including cleaning, temporary utilities and temporary facilities, and continuously provide consumables as required.
7. Temporary utilities and temporary facilities shall be adequate for personnel using the Site and the needs of the Project.
8. Provide temporary utilities and temporary facilities in compliance with Laws and Regulations and, when applicable, requirements of utility owners.

1.2 REQUIREMENTS FOR TEMPORARY UTILITIES AND TEMPORARY FACILITIES

A. Electrical:

1. Provide temporary electrical service required for the Work, including continuous power for temporary field offices and sheds. Provide temporary outlets with circuit breaker protection and ground fault protection.
- B. Lighting.
1. Provide lighting at the Site of not less than five foot-candles for open areas and not less than ten foot-candles for stairs and shops. Provide not less than one, 300-watt lamp every 15 feet in indoor work areas. Provide night security lighting of not less than five foot-candles within 50 feet of all parts of the Site during hours of darkness, controlled by photocell.
 2. Do not work in areas with insufficient lighting. Where lighting is insufficient for the work activities to be performed, provide additional temporary lighting.
 3. Provide temporary lighting sufficient for observation of the Work by ENGINEER and inspection by CONTRACTOR and authorities having jurisdiction. Where required by ENGINEER, provide additional temporary lighting.
- C. Telephone and Communications.
1. Provide temporary telephone and communications required for CONTRACTOR's operations at the Site and for summoning emergency medical assistance.
 2. Provide temporary telephone and communications for ENGINEER's field office in accordance with Section 01 52 11, Engineer's Field Office.
- D. Heating, Ventilating, and Enclosures.
1. Provide sufficient temporary heating, cooling, ventilating, and enclosures to ensure safe working conditions and prevent damage to existing facilities and the Work.
 2. Except where otherwise specified, temporary heating shall maintain temperature of the space served between 50 degrees F and maximum design temperature of building or facility and its contents.
 3. Maintain temperature of areas occupied by OWNER's personnel or electronic equipment, including offices, lunch rooms, locker rooms, toilet rooms, and rooms containing computers, microprocessors, and control equipment, between 65 degrees F and 80 degrees F with relative humidity less than 75 percent.
 4. Required temperature range for storage areas and certain elements of the Work, including preparation of materials and surfaces, installation or application, and curing as applicable, shall be in accordance with the Contract Documents for the associated Work and the Supplier's recommended temperature range for storage, application, or installation, as appropriate.
 5. Provide temporary ventilation sufficient to prevent accumulation in construction areas and areas occupied by OWNER of hazardous and nuisance levels or concentrations of dust and particulates, mist, fumes or vapors, odors, and gases, associated with construction.
 6. Provide temporary enclosures and partitions required to maintain required temperature and humidity.

- E. Water:
1. General:
 - a. Provide temporary water facilities including piping, valves, meters if not provided by owner of existing waterline, backflow preventers, pressure regulators, and other appurtenances. Provide freeze-protection as required.
 - b. Continuously maintain adequate water flow and pressure for all purposes during the Project, until removal of temporary water systems.
 2. Water for Construction Purposes:
 - a. Provide water for Site maintenance and cleaning and, water necessary for construction activities, and water for disinfecting and testing of systems.
 - b. CONTRACTOR may use existing hose bibbs for short-term wash-downs and intermittent use of water for work areas in the existing building. Obtain consent of ENGINEER and OWNER if connections to existing hose bibbs and similar existing connections will be used for more than one day at a time.
 3. Water for Human Consumption and Sanitation:
 - a. Provide potable water in accordance with Laws and Regulations for consumption by personnel at the Site, for field offices, and for sanitary facilities.
 - b. When necessary, provide bottled, potable water for use and consumption by personnel at the Site, including CONTRACTOR, ENGINEER, and visitors to the Site.
 - c. Provide temporary water for ENGINEER's field office in accordance with Section 01 52 11, Engineer's Field Office.
- F. Sanitary Facilities.
1. Provide suitably-enclosed chemical or self-contained toilets for CONTRACTOR's employees, Subcontractors, Suppliers, ENGINEER, and visitors to the Site. Location of temporary toilets shall be acceptable to OWNER and ENGINEER.
 2. Refer to Paragraph 1.2.E of this Section for requirements for water intended for human consumption during construction.
 3. Provide suitable temporary washing facilities for employees and visitors.
 4. Provide temporary sanitary facilities for ENGINEER's field office in accordance with Section 01 52 11, Engineer's Field Office.
- G. First-aid Facilities.
1. Provide temporary first-aid stations at or immediately adjacent to the Site's work areas, and inside CONTRACTOR's temporary field office. Locations of first-aid stations shall be determined by CONTRACTOR's safety representative. Replenish supplies in first-aid stations as items are used, prior to expiration of items, and as necessary. Monitor and log inventory of supplies in first-aid stations in accordance with requirements for monitoring and logging safety equipment as indicated in Section 01 35 23, Safety Requirements.

2. Provide list of emergency telephone numbers at each hardwired telephone at the Site. List shall be in accordance with the list of emergency contact information required in Section 01 35 23, Safety Requirements.
3. Provide temporary first-aid facilities for ENGINEER's field office in accordance with Section 01 52 11, Engineer's Field Office.

H. Fire Protection.

1. Provide temporary fire protection, including portable fire extinguishers rated not less than 2A or 5B in accordance with NFPA 10, Portable Fire Extinguishers, for each temporary building and for every 3,000 square feet of floor area under construction.
2. Provide Class A (ordinary combustibles), Class B (combustible liquids and gases), and Class C (electrical equipment) fire extinguishers as necessary.
3. Comply with NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, and requirements of fire marshals and authorities having jurisdiction at the Site.
4. Provide temporary fire protection for ENGINEER's field office in accordance with Section 01 52 11, Engineer's Field Office.

1.3 USE OF OWNER'S SYSTEM

- A. Existing Utility Systems: Do not use systems in existing buildings or structures for temporary utilities without OWNER's written permission and mutually acceptable basis agreed upon by the parties for proportionate sharing of costs between OWNER and CONTRACTOR.
- B. Use of Permanent Utility Systems Provided Under the Project:
1. Permanent electrical, lighting, water, heating, ventilating, and fire protection systems and first-aid facilities may be used to provide temporary utilities and temporary facilities if the following are met:
 - a. Obtain OWNER's written permission to use permanent systems.
 - b. Permanent systems to be used for temporary utilities or temporary facilities shall be substantial complete, including complete functionality of all controls.
 - c. CONTRACTOR shall pay all costs while using permanent system, including operation, maintenance, replacement of consumables, and provide replacement parts.
 2. Do not use the following permanent facilities:
 - a. Telephone and communication facilities.
 - b. Sanitary facilities.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for temporary utilities and temporary facilities may be new or used, but shall be adequate for purposes intended and shall not create unsafe conditions, and shall comply with Laws and Regulations.
- B. Provide required materials, equipment, and facilities, including piping, cabling, controls, and appurtenances.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install temporary utilities and temporary facilities in neat, orderly, manner, and make structurally, mechanically, and electrically sound throughout.
- B. Location of Temporary Utilities and Temporary Facilities:
 - 1. Locate temporary systems for proper function and service.
 - 2. Temporary systems shall not interfere with or provide hazards or nuisances to: the Work under this and other contracts, movement of personnel, traffic areas, materials handling, hoisting systems, storage areas, finishes, and work of utility owners and others.
 - 3. Do not install temporary utilities on the ground, with the exception of temporary extension cords, hoses, and similar systems in place for short durations.
- C. Modify and extend temporary systems as required by progress of the Work.

3.2 USE

- A. Maintain temporary systems to provide safe, continuous service as required.
- B. Properly supervise operation of temporary systems:
 - 1. Enforce compliance with Laws and Regulations.
 - 2. Enforce safe practices.
 - 3. Prevent abuse of services.
 - 4. Prevent nuisances and hazards caused by temporary systems and their use.
 - 5. Prevent damage to finishes.
 - 6. Ensure that temporary systems and equipment do not interrupt continuous progress of construction.
- C. At end of each work day, check temporary systems and verify that sufficient consumables are available to maintain operation until work is resumed at the Site. Provide additional consumables if the supply on hand is insufficient.

3.3 REMOVAL

- A. Completely remove temporary utilities, temporary facilities, equipment, and

materials when no longer required. Repair damage caused by temporary systems and their removal and restore the Site to condition required by the Contract Documents; if restoration of damaged areas is not specified, restore to preconstruction condition.

- B. Where temporary utilities are disconnected from existing utility, provide suitable, watertight or gastight (as applicable) cap or blind flange, as applicable, on service line, in accordance with requirements of utility owner.
- C. Where permanent utilities and systems were used for temporary utilities, upon Substantial Completion replace all consumables such as filters and light bulbs and parts used during the Work.

+ + END OF SECTION + +

SECTION 01 52 13

CONTRACTOR'S FIELD OFFICE AND SHEDS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. CONTRACTOR shall provide a temporary field office for CONTRACTOR's use with not less than the minimum facilities specified.
 - 2. Provide required temporary storage and work sheds.
 - 3. Obtain and pay for required permits and utilities. Field offices and sheds shall comply with Laws and Regulations.
- B. Coordination:
 - 1. Coordinate with OWNER, facility manager, other contractors, and others using the Site the location of field offices and sheds, including contracts indicated in Section 01 12 13, Summary of Work.
- C. Location:
 - 1. Locate field offices and sheds in accordance with the Contract Documents and in accordance with the Site mobilization discussions at the preconstruction conference.
- D. Furnish in CONTRACTOR's field office one complete set of the Contract Documents for ready reference by interested persons. In addition to the reference set, comply with Section 01 78 39, Project Record Documents and related provisions of the General Conditions, as may be modified by the Supplementary Conditions.

PART 2 – PRODUCTS

2.1 FIELD OFFICE AND SHEDS – FURNISHINGS, AND EQUIPMENT

- A. Contractor's Field Office and Furnishings:
 - 1. Construction: As required by CONTRACTOR.
 - 2. Utilities and Services: Provide the following:
 - a. Telephone service.
 - b. Computer network and related facilities as required for CONTRACTOR's needs.
 - 3. Provide on field office's exterior an identification sign displaying CONTRACTOR's company name. Maximum size of sign shall be four feet by eight feet. Sign shall be suitable for outdoor use for the duration of the Project.
 - 4. Furnish and maintain at CONTRACTOR's field office 6 protective helmets ('hard hats') for use by visitors to the Site.

B. Contractor's Storage and Work Sheds:

1. Provide storage and work sheds sized, furnished, and equipped to accommodate personnel, materials, and equipment involved in the Work, including temporary utility services and facilities required for environmental controls sufficient for personnel, materials, and equipment.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation:

1. Install CONTRACTOR's temporary field offices, sheds, and related facilities in accordance with Laws and Regulations.
2. Install materials and equipment, including prefabricated structures, in accordance with manufacturer's instructions.

3.2 MAINTENANCE AND REMOVAL

A. Maintenance:

1. Clean and maintain field offices and sheds as required.
2. Provide consumables as required.

B. Removal:

1. Do not remove temporary field offices and sheds until after Substantial Completion of the entire Work, unless otherwise approved by ENGINEER.
2. Remove field offices and sheds and restore areas prior to final inspection.

+ + END OF SECTION + +

SECTION 01 52 16

FIRST AID FACILITIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for temporary first-aid facilities for personnel use at Site during construction, including first-aid stations, lists of emergency contact information, and first-aid-trained personnel.
2. General CONTRACTOR shall provide first-aid facilities during the Project, including:
 - a. Paying all costs for first-aid facilities, including installation, maintenance, and removal.
 - b. Maintaining, including cleaning, first-aid facilities. Keep first-aid facilities continuously supplied with consumables.
 - c. Facilities shall be adequate for personnel using the Site.
 - d. Providing facilities in compliance with Laws and Regulations.

1.2 TEMPORARY FIRST-AID FACILITIES REQUIRED

A. Provide the following temporary first-aid facilities:

1. First-aid Stations at the Site:
 - a. Provide temporary first-aid stations at or immediately adjacent to the Site's major work areas, and inside General CONTRACTOR's temporary field office.
 - b. Locations of first-aid stations shall be determined by General CONTRACTOR's safety representative.
 - c. Other contractors shall provide first-aid stations in their own field office.
 - d. First-aid stations shall be adequate for the number of personnel at the Site and the types of work and hazards anticipated.
 - e. Not less-often than monthly, inspect each temporary first-aid station and inventory items consumed or used and remove items that are at or near their expiration date. Promptly replace and restock consumables and expired items.
2. Emergency Contact List:
 - a. Provide list of emergency telephone numbers at each hardwired telephone at the Site.
 - b. List shall be in accordance with the list of emergency contact information required in Section 01 35 23, Safety Requirements.
3. Personnel Trained in First-Aid:
 - a. When work is in progress, furnish at the Site not less than one person trained in first-aid.

- b. First-aid-trained personnel shall possess valid certificate indicating that they have successfully completed first-aid training course by the American Red Cross or similar entity.

B. Restrictions:

1. Existing Facilities: In general, OWNER's existing first-aid facilities shall not be used by contractors without written permission of OWNER with conditions for use. Exceptions include life-threatening situations. When used, promptly and completely restock and restore such facilities with identical items.
2. Permanent Facilities Provided Under the Project: In general, contractors shall not use permanent first-aid facilities provided under the Project. Exceptions include life-threatening situations. When used, promptly and completely restock and restore such facilities with identical items.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 USE

A. Use of Temporary Facilities:

1. Properly supervise temporary facilities.
2. Properly dispose of wastes.

3.2 REMOVAL

- A. Completely remove temporary facilities and materials when no longer required. Repair damage caused by temporary facilities and their removal and restore Site to condition required by the Contract Documents; if restoration of damaged areas is not specified, restore to preconstruction condition.

+ + END OF SECTION + +

SECTION 01 52 19

SANITARY FACILITIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. General CONTRACTOR shall provide all temporary sanitary facilities required for the Project.
 - a. Make all arrangements with temporary sanitary facility providers for temporary sanitary services and obtain required permits and approvals for temporary sanitary facilities and associated services.
 - b. Pay all costs for temporary sanitary facilities and associated services, including cost of electricity, water, fuel, and other utility services required for temporary sanitary facilities.
 - c. Continuously maintain adequate temporary sanitary facilities for all purposes during the Project, until removal of temporary sanitary facilities. At minimum, provide and maintain temporary sanitary facilities through Substantial Completion and removal of temporary field offices and sheds, and at all times thereafter when CONTRACTOR is at the Site performing Work.
 - d. Maintain and clean the temporary sanitary facilities and continuously provide consumables as required.
 - e. Temporary sanitary facilities shall be adequate for personnel using the Site and requirements of Project.
 - f. Provide temporary sanitary facilities in compliance with Laws and Regulations and, when applicable, requirements of utility owners.

1.2 REQUIREMENTS FOR TEMPORARY SANITARY FACILITIES

A. Sanitary Facilities.

1. Portable Toilets:
 - a. Provide suitably-enclosed, temporary chemical or self-contained toilets for CONTRACTOR's employees and visitors to the Site.
 - b. Location of temporary toilets shall be acceptable to OWNER.
2. Drinking Water:
 - a. Provide supply of potable drinking water and related facilities and consumables for all personnel using the Site, including employees of contractors, OWNER, facility manager, ENGINEER, visitors, and others.
 - b. Location of potable drinking water supply shall be as required by CONTRACTOR and convenient for access by personnel
 - c. Provide potable drinking water supply and cups.
 - d. Replenish drinking water supply as needed. Avoid creating hazards to health and safety caused by shortages of drinking water quantity and

- inadequate quality.
 - e. Drinking water quality shall comply with Laws and Regulations.
- 3. Washing Facilities:
 - a. Provide suitable temporary washing facilities for employees, ENGINEER, and visitors to the Site.
 - b. Washing facilities shall be adequate for the nature of work underway at the Site.
 - c. Properly handle, store, and dispose of used wash water, in accordance with Laws and Regulations.

1.3 USE OF OWNER'S SYSTEM

- A. Existing Sanitary Facilities:
 - 1. Do not use facilities in existing buildings or structures for temporary sanitary facilities without written permission of OWNER and facility manager and mutually acceptable basis agreed upon by the parties for proportionate sharing of costs between OWNER and CONTRACTOR.
- B. Use of Permanent Sanitary Facilities Provided Under the Project:
 - 1. CONTRACTOR's personnel shall not use the following permanent facilities:
 - a. Sanitary facilities.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for temporary sanitary facilities may be new or used, but shall be adequate for purposes intended and shall not create unsafe conditions, and shall comply with Laws and Regulations.
- B. Provide required materials, equipment, and facilities, including piping, wiring, and controls.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install temporary sanitary facilities in neat, orderly, manner, and make structurally, mechanically, and electrically sound throughout.
- B. Location of Temporary Sanitary Facilities:
 - 1. Locate temporary sanitary facilities for proper function and service.
 - 2. Temporary sanitary facilities shall not interfere with or provide hazards or nuisances to: the Work under this and other contracts, movement of personnel, traffic areas, materials handling, hoisting systems, storage areas, finishes, and work of utility companies.

- C. Modify and extend temporary sanitary facilities as required by progress of the Work.

3.2 USE

- A. Maintain temporary sanitary facilities to provide safe, continuous service as required.
- B. Supervision and Enforcement of Use:
 - 1. Properly supervise operation of temporary sanitary facilities.
 - 2. Enforce compliance with Laws and Regulations.
 - 3. Enforce safe practices.
 - 4. Prevent abuse of services.
 - 5. Prevent nuisances and hazards caused by temporary sanitary facilities and their use.
 - 6. Prevent damage to finishes.
 - 7. Ensure that temporary sanitary facilities do not interrupt continuous progress of the Work.
- C. Checks and Consumables:
 - 1. At end of each work day, check temporary sanitary facilities and verify that sufficient consumables are available to maintain operation until work is resumed at the Site.
 - 2. Provide additional consumables if the supply on hand is insufficient.

3.3 REMOVAL

- A. Completely remove temporary sanitary facilities and materials when no longer required. Repair damage caused by temporary sanitary facilities and their removal and restore the Site to condition required by the Contract Documents; if restoration of damaged areas is not specified, restore to pre-construction condition.
- B. When permanent sanitary facilities were used for temporary sanitary facilities, immediately prior to requesting inspection for Substantial Completion, replace all consumables used during the Work and verify suitability of sanitary facilities for OWNER's permanent use. Correct deficiencies and damage.

+ + END OF SECTION + +

SECTION 01 55 13

ACCESS ROADS AND PARKING AREAS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. General CONTRACTOR shall provide temporary construction roads, walks, parking areas, and appurtenances required during the Project for use by CONTRACTOR, other contractors employed on the Project, OWNER's, facility manager's, and emergency vehicles.
2. Temporary roads and parking areas shall be designed and maintained by CONTRACTOR and shall be fully passable to vehicles in all weather conditions.

B. Use of Existing Access Roads:

1. CONTRACTOR is allowed to use OWNER's existing roads starting on the Effective Date of the Contract and satisfying other Contract requirements relative to starting the Work.
2. Prevent interference with traffic on existing roads and parking areas. Always keep access roads and entrances serving the Site clear and available to OWNER, facility manager, and their respective employees; emergency vehicles; and other contractors. Do not use access roads or Site entrances for parking or storage of materials or equipment.
3. CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER from expenses and losses caused by CONTRACTOR's operations over existing roads, drives, and parking areas.
4. Schedule deliveries to minimize use of driveways and Site entrances.

1.2 SITE ACCESS

A. Site Access:

1. CONTRACTOR access to the Site shall be via the main gate.
2. Access to the Site is limited H2O loading.

1.3 CONTRACTOR PARKING

- A. CONTRACTOR employee vehicles shall park in area(s) indicated in Section 01 57 33, Security.
- B. Park construction vehicles and equipment in work areas off of permanent roads and parking areas, in areas of the Site designated for CONTRACTOR staging.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Materials for temporary roads and parking areas shall comply with the Contract Documents' requirements for permanent roads, drives, and parking areas.
- B. Traffic controls shall comply with requirements of authorities having jurisdiction. When such authority is the OWNER or facility manager, and no requirements are indicated, comply with the standard specifications of the state department of transportation in the area of the Project.

PART 3 – EXECUTION

3.1 TEMPORARY ROADS AND PARKING AREAS

- A. Temporary Roads and Parking in Areas Different from Permanent Pavement:
 - 1. Provide temporary roads and parking areas adequate to support and withstand traffic loads during the Project. Locate temporary roads and parking areas as shown.
 - 2. Provide reasonably-level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the upper six inches.
 - 3. Where required to support loads and provide separation between subgrade and subbase materials, provide geosynthetic separation fabric as required.
 - 4. Subbase:
 - a. Provide crushed stone subbase material not less than six inches thick, roller-compacted to a level, smooth, dense surface.
 - b. Subbase for temporary roads and areas traveled by construction vehicles shall be adequate for loads and traffic served.
- B. Temporary Roads and Parking in Same Areas as Permanent Pavement:
 - 1. Provide temporary roads and parking areas adequate to support and withstand traffic and construction loads during the Project. Locate temporary roads and parking areas in same location as permanent roads and parking areas. Extend temporary roads and parking areas, within construction limits indicated, as required for construction operations.
 - 2. Coordinate elevations of temporary roads and parking areas with permanent roads and parking areas.
 - 3. Prepare subgrade, subbase, and base for temporary roads and parking areas in accordance with the Contract Documents requirements for permanent roads, drives, and parking areas.
 - 4. Where required by subgrade conditions and construction loads and traffic, provide geosynthetic separation fabric as required on compacted subgrade for subbase support and separation of subbase and subgrade materials.

5. Re-condition granular subbase of temporary roads and parking areas, including removing and properly disposing of granular material that has become intermixed with soil, re-grading, proof-rolling, compacting, and testing.

3.2 TRAFFIC CONTROLS

A. Traffic Controls:

1. Provide temporary traffic controls at intersections of temporary roads with each other and with parking areas, including intersections with other temporary roads, intersections with public roads, and intersections with permanent access roads at the Site.
2. Provide temporary warning signs on permanent roads and drives, and provide temporary "STOP" signs for traffic on temporary roads where required and at entrances to permanent pavement.
3. Comply with requirements of authorities having jurisdiction. When such authority is the OWNER or facility manager, and no requirements are indicated, comply with the standard specifications of the state department of transportation in the area of the Project.

3.3 MAINTENANCE OF ROADS

A. General:

1. Maintain temporary roads and parking to continuously provide at the Site access for construction vehicles and trucks, OWNER and facility manager vehicles, deliveries for OWNER and facility manager, emergency vehicles, and parking areas for OWNER's and facility manager's personnel.
2. Public roads shall be passable at all times unless a road closure is allowed in writing by authority having jurisdiction.
3. When granular material of temporary roads and parking without hard surfacing become intermixed with soil or when temporary roads otherwise create a nuisance, remove intermixed granular-and-soil material and replace with clean granular material as required.
4. Provide snow and ice removal for temporary roads and parking areas.

B. Cleaning and Dust Control:

1. Cleaning: Clean paved surfaces over which construction vehicles travel. Perform cleaning not less often than the frequency indicated in Section 01 74 05, Cleaning, or more frequently as directed by ENGINEER, by mechanical sweeping or other means acceptable to ENGINEER.
2. Clean the following surfaces:
 - a. Roads within limits of the Project.
 - b. Permanent roads at the Site between the Site entrance and the work areas, and between the Site entrance and construction parking and staging areas.
 - c. Public roads that require sweeping and cleaning due to construction operations.
3. Dust Control:

- a. Control dust resulting from construction activities to prevent nuisances at the Site and in nearby areas.
 - b. Comply with Section 01 41 27, Earthmoving and Dust Control, and Section 01 57 00, Temporary Controls.
- C. Protection of Underground Facilities: Comply with the General Conditions, as may be modified by the Supplementary Conditions, Section 01 71 33, Protection of the Work and Property, and other requirements of the Contract Documents.

3.4 REMOVALS AND RESTORATION

A. Removals:

- 1. Remove temporary roads, drives, walks, and parking areas that are not intended for, or acceptable for, integration into permanent pavement. Return areas of temporary roads, drives, walks, and parking to pre-construction condition unless otherwise required by the Contract Documents.
- 2. Remove temporary gates, fencing, and traffic controls associated with temporary roads and parking areas.
- 3. Where areas of temporary roads and parking will be permanently landscaped, remove pavement, granular subbase, geosynthetic (where required by ENGINEER), soil, and other materials that do not comply with the Contract Documents regarding fill, subsoil, and landscaping.
- 4. Remove and properly dispose of materials contaminated with oil, bitumen, and other petrochemical compounds resulting from CONTRACTOR's operations, and other substances that might impair growth of plants and lawns.

B. Restoration:

- 1. Repair or replace paving, curbs, gutters, and sidewalks affected by temporary roads and parking, and restore to required conditions in accordance with authorities having jurisdiction.
- 2. Restore to pre-construction conditions existing roads, walks, and parking areas damaged by CONTRACTOR, subject to approval of the owner of affected roads, drives, walks, and parking areas.

+ + END OF SECTION + +

SECTION 01 55 26

MAINTENANCE AND PROTECTION OF TRAFFIC

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall keep all roads, streets, and traffic ways open for passage of traffic and pedestrians during the Work, unless otherwise approved by owner of the street, traffic way, or right-of-way, as applicable.
2. Construction traffic shall access the Site only via entrance(s) indicated in Section 01 55 13, Access Roads and Parking Areas.
3. Unless otherwise shown or indicated in the Contract Documents, maintenance and protection of traffic shall be in accordance with Department of Transportation Specifications of the State of New York.

B. Coordination:

1. Coordinate with owner of the highway or street right-of-way, as applicable, for maintenance and protection of traffic requirements.
2. Give required advance notice to fire departments, police departments, and other emergency services as applicable of proposed construction operations.
3. Give reasonable notice to owners or tenants of private property who may be affected by construction operations. Give such notice not less than five days prior to when such property will or may be affected by construction operations.
4. Coordinate with requirements of the following:
 - a. Section 01 14 33, Work in Highway Rights-of-Way.
 - b. Section 01 55 13, Access Roads and Parking Areas.
 - c. Section 01 71 33, Protection of the Work and Property, regarding temporary barriers.
 - d. Section 31 23 05, Excavation and Fill, for temporary barriers at excavations.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Procedure Submittals: Detailed plan, procedures, and sequencing for maintaining and protecting traffic in accordance with the Contract Documents and requirements of authorities having jurisdiction. Include in the submittal the following:
 - a. Traffic staging plan, and construction sequencing as applicable to maintain and protect traffic.
 - b. Product data, including manufacturer's catalog information and specifications, for temporary signage, temporary signals, temporary

- illumination devices, and other products to be utilized in maintaining and protecting traffic.
- c. Indication of number and types of personnel dedicated to maintaining and protecting traffic during construction.
- d. Indication of plan acceptance from authorities having jurisdiction.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment used for maintenance and protection of traffic shall comply with the reference specification indicated in Paragraph 1.1.A.3 of this Section.

PART 3 – EXECUTION

3.1 GENERAL PROVISIONS

- A. When required to cross, obstruct, or temporarily close a street or traffic way, provide and maintain suitable bridges, detours, or other acceptable temporary expedient for the accommodation of traffic. Closings shall be for shortest duration practical, and passage shall be restored immediately after completion of filling and temporary paving or bridging.
- B. Temporary Control Devices:
 - 1. Provide temporary signs, signals, barricades, flares, lights and other equipment, services, and personnel required to regulate and protect traffic and warn of hazards.
 - 2. Such Work shall comply with requirements of OWNER and authorities having jurisdiction at the Site.
 - 3. Remove temporary equipment and facilities when no longer required, and restore grounds to condition indicated in the Contract Documents; if not indicated, resort to pre-construction conditions.
- C. Keep accessible for use permanent facilities such as hydrants, valves, fire alarm boxes, postal boxes, delivery service boxes, and other facilities that may require access during construction.

3.2 TRAFFIC SIGNALS AND SIGNS

- A. Provide and operate temporary traffic controls and directional signals required to direct and maintain an orderly flow of traffic in areas under CONTRACTOR's control, and areas affected by construction operations.
- B. Provide temporary traffic controls and directional signs, mounted on temporary barriers or standard posts, at the following locations:

1. Each change of direction of a roadway and at each crossroad.
2. Detours and areas of hazard.
3. Parking areas.
4. Traffic entrance to and exit from each construction area.

3.3 TRAFFIC CONTROL PERSONNEL

A. General:

1. When construction operations encroach on traffic lanes, furnish qualified and suitably-equipped traffic control personnel as required for regulating traffic and in accordance with requirements of authorities having jurisdiction.
2. Traffic control personnel shall use appropriate flags or mobile signs.
3. Equip traffic control personnel with appropriate personal protection equipment and suitable attire.
4. Attire and conduct of traffic control personnel shall be appropriate and shall not create nuisances or distractions for traffic.

3.4 FLARES AND LIGHTS

A. During periods of low visibility provide temporary flares and lights for the following:

1. To clearly delineate traffic lanes, to guide traffic, and to warn of hazardous areas.
2. For use by traffic control personnel directing traffic.

B. Provide adequate illumination of critical traffic and parking areas.

3.5 PARKING CONTROL

A. Control CONTRACTOR-related vehicular parking at the Site to preclude interfering with: traffic and parking, access by emergency vehicles, OWNER's and facility manager's operations, and construction operations. Provide temporary parking facilities for the public, as required because of construction operations.

B. Control parking of construction and private vehicles at the Site as follows:

1. Maintain free vehicular access to and through parking areas.
2. Prohibit parking on or adjacent to access roads, and in non-designated areas.
3. Construction vehicles shall possess current vehicle registration.
4. Private vehicles shall park only in designated areas.

3.6 HAUL ROUTES

A. Submit proposed haul routes to ENGINEER and OWNER and obtain approval of authorities having jurisdiction.

B. Confine construction traffic to designated haul routes.

- C. Provide temporary traffic controls at critical areas of haul routes to expedite traffic flow, and to minimize interference with normal traffic.

3.7 REMOVAL

- A. Maintain and protect traffic until Substantial Completion and at all times thereafter when CONTRACTOR is working at the Site. Provide maintenance and protection of traffic measures at the Site until no longer required due to the progress of the Work. When no longer required, completely remove maintenance and protection of traffic measures and restore the Site to condition required by the Contract Documents or, when not indicated in the Contract Documents, to pre-construction conditions.

+ + END OF SECTION + +

SECTION 01 57 05

TEMPORARY CONTROLS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide and maintain methods, materials, equipment, and temporary construction as required for controlling environmental conditions at the Site and adjacent areas during construction.
2. Maintain controls until no longer required. Provide temporary controls at all times when CONTRACTOR is working at the Site.
3. Temporary controls include, but are not limited to, the following:
 - a. Erosion and sediment controls.
 - b. Noise controls.
 - c. Dust controls.
 - d. Pest and rodent controls.
 - e. Control of water, including storm water runoff.
 - f. Pollution controls.

B. Related Sections:

1. Section 01 35 43.13, Environmental Procedures for Hazardous Materials.
2. Section 01 35 44, Spill Prevention Control and Countermeasures Plan.
3. Section 01 41 26, Storm Water Pollution Prevention Plan and Permit.
4. Section 01 41 27, Earthmoving Permit and Dust Control.
5. Section 31 23 05, Excavation and Fill.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions and recommendations of the following:

1. New York State.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Plan for construction staging and maintenance of the Site relative to erosion and sediment controls. Indicate on a site plan approximate areas of planned disturbance of soils and soil cover over time during the Project. For areas not indicated in the Contract Documents as being disturbed and that CONTRACTOR proposes to disturb, Shop Drawing shall include proposed erosion and sediment control measures for the additional area.
 - b. Location and details of temporary settlement basin(s).

2. Product Data:
 - a. Silt fencing materials.
- B. Informational Submittals: Submit the following:
 1. Procedural Submittals:
 - a. Proposed dust control measures, when submittal is requested by ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS FOR TEMPORARY EROSION AND SEDIMENT CONTROLS

- A. Materials for temporary erosion and sediment controls shall be as shown or indicated on the Drawings.

PART 3 – EXECUTION

3.1 NOISE CONTROL

- A. Noise Control – General:
 1. CONTRACTOR's vehicles and equipment shall minimize noise emissions to greatest degree practicable. When necessary, provide mufflers and silencers on construction equipment, and provide temporary sound barriers onsite when necessary.
 2. Noise levels shall comply with Laws and Regulations, including OSHA requirements and local ordinances.
 3. Noise emissions shall not interfere with the work of OWNER, facility manager, or others.

3.2 DUST CONTROL

- A. Dust Control – General:
 1. Control objectionable dust caused by CONTRACTOR's operation of vehicles and equipment, clearing, demolition, cleaning, and other actions. To minimize airborne dust, apply water or use other methods subject to acceptance of ENGINEER and approval of authorities having jurisdiction.
 2. CONTRACTOR shall prevent blowing and movement of dust from exposed soil surfaces and access roads to reduce onsite and off-Site damage, nuisances, and health hazards associated with dust emissions.
 3. Comply with Section 01 41 27, Earthmoving Permit and Dust Control.
- B. Dust Control Methods:
 1. Dust control may be achieved by irrigation in which the dust-prone area of the Site shall be sprinkled with water until the surface is moist.

2. Apply dust controls as frequently as required without creating nuisances such as excessive mud and ponding of water at the Site. Do not use water for dust control when water will cause hazardous or objectionable conditions such as ice, mud, ponds, and pollution.
 3. Provide dust control that is non-polluting and does not contribute to tracking-out of dirt and dust onto pavement.
- C. Removal of Dust and Dirt from Travelled Surfaces:
1. Remove dust and dirt from roadways, drives, parking areas, and other travelled surfaces not less than the frequency indicated in Section 01 74 05, Cleaning.
 2. Perform dust and dirt removals from travelled surfaces by mechanical sweeping or other method acceptable to ENGINEER.

3.3 PEST AND RODENT CONTROL

- A. Pest and Rodent Control – General:
1. Provide pest and rodent controls as required to prevent infestation of the Site and storage areas.
 2. Employ methods and use materials that do not adversely affect conditions at the Site or on adjoining properties.
 3. In accordance with Laws and Regulations, promptly and properly dispose of pests and rodents trapped or otherwise controlled.

3.4 WATER CONTROL

- A. Water Control – General:
1. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site, and adjoining properties.
 2. Control fill, grading, and ditching to direct water away from excavations, pits, tunnels and other construction areas and to direct drainage to proper runoff courses to prevent erosion, damage, or nuisance. Avoid directing to adjoining properties runoff from the Site and construction operations.
- B. Equipment and Facilities for Water Control:
1. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
- C. Discharge and Disposal:
1. Dispose of storm water and ground water in manner to prevent flooding, erosion, and other damage to any and all parts of the Site and adjoining areas, and that complies with Laws and Regulations.

3.5 POLLUTION CONTROL

- A. Pollution Control – General:

1. Provide means, methods, and facilities required to prevent contamination of soil, water, and atmosphere caused by discharge of noxious substances from or caused by construction operations.
 2. Equipment used during construction shall comply with Laws and Regulations.
 3. Comply with Section 01 35 43.13, Environmental Procedures for Hazardous Materials.
- B. Spills and Contamination:
1. Provide equipment and personnel to perform emergency measures required to contain spills and to remove contaminated soils and liquids.
 2. Excavate contaminated material and properly dispose of off-Site, and replace with suitable compacted fill and topsoil.
 3. Comply with Section 01 35 44, Spill Prevention Control and Countermeasures Plan, and OWNER's and facility manager's hazard control procedures as indicated in Section 01 35 23, Safety Requirements.
- C. Protection of Surface Waters and Ground Water:
1. Provide and maintain special measures to prevent harmful substances from entering surface waters and ground water. Prevent disposal of wastes, effluents, chemicals, and other such substances in or adjacent to surface waters and open drainage routes, in sanitary sewers, or in storm sewers, and in ground water.
- D. Atmospheric Pollutants:
1. Provide and maintain systems for controlling atmospheric pollutants related to the Work.
 2. Prevent toxic concentrations of chemicals and vapors.
 3. Prevent harmful dispersal of pollutants into atmosphere.
- E. Solid Waste:
1. Provide and maintain systems for controlling and managing solid waste related to the Work.
 2. Prevent solid waste from becoming airborne, and from discharging to surface waters and drainage routes.
 3. Properly handle and dispose of solid waste.
 4. Comply with requirements for cleaning and disposal of debris in the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 74 05, Cleaning.

3.6 EROSION AND SEDIMENT CONTROLS

- A. Installation and Maintenance of Erosion and Sediment Controls – General:
1. General:
 - a. Provide temporary erosion and sediment controls as shown and indicated on the Drawings and as indicated elsewhere in the Contract Documents. Provide erosion and sediment controls as the Work progresses into previously-undisturbed areas.

- b. Installation of erosion and sediment controls shall be in accordance with the applicable regulatory requirements indicated in Article 1.2 of this Section, unless more-stringent methods are otherwise shown or indicated in the Contract Documents.
 - c. Use necessary methods to successfully control erosion and sedimentation, including ecology-oriented construction practices, vegetative measures, and mechanical controls. Use best management practices (BMP) in accordance with Laws and Regulations, and regulatory requirements indicated in Article 1.2 of this Section, to control erosion and sedimentation during the Project.
 - d. Plan and execute construction, disturbances of soils and soil cover, and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation. Provide temporary measures for controlling erosion and sedimentation, as indicated in the Contract Documents and as required for the Project.
 - e. Where areas must be cleared for storage of materials or equipment, or for temporary facilities, provide measures for regulating drainage and controlling erosion and sedimentation, subject to the ENGINEER'S approval.
 - f. Provide erosion and sediment controls, including stabilization of soils, at the end of each workday.
2. Coordination:
 - a. Coordinate erosion and sediment controls with this Section's requirements on water control, and with Section 01 41 26, Storm Water Pollution Prevention Plan and Permit.
 - b. Coordinate temporary erosion and sediment controls with construction of permanent drainage facilities and other Work to the extent necessary for economical, effective, and continuous erosion and sediment controls.
 3. Before commencing activities that will disturb soil or soil cover at the Site, provide all erosion and sediment control measures required by the Contract Documents for the areas where soil or soil cover will be disturbed.
 4. In general, implement construction procedures associated with, or that may affect, erosion and sediment control to ensure minimum damage to the environment during construction. CONTRACTOR shall implement any and all additional measures required to comply with Laws and Regulations, and Section 01 41 26, Storm Water Pollution Prevention Plan and Permit.
 5. Vegetation Removal: Remove only those shrubs, grasses, and other vegetation that must be removed for construction. Protect remaining vegetation.
 6. Access Roads and Parking Areas: When possible, access roads and temporary roads and parking shall be located and constructed to avoid adverse effects on the environment. Provide measures to regulate drainage, avoid erosion and sedimentation, and minimize damage to vegetation.
 7. Earthwork and Temporary Controls:
 - a. Perform excavation, fill, and related operations in accordance with Section 31 23 05, Excavation and Fill.

- b. Control erosion to minimize transport of silt from the Site into existing waterways and surface waters. Such measures shall include, but are not limited to, using berms, silt fencing, baled straw silt barriers, gravel or crushed stone, mulching and soil stabilization, slope drains, and other methods. Apply such temporary measures to erodible materials exposed by activities associated with the construction of the Project.
 - c. Hold to a minimum the areas of bare soil exposed at one time.
 - d. Construct fills and waste areas by selectively placing fill and waste materials to eliminate surface silts and clays that will erode.
 - e. In performing earthwork, eliminate depressions that could serve as mosquito breeding pools.
 - f. CONTRACTOR shall provide special care in areas with steep slopes, where disturbance of vegetation shall be minimized to maintain soil stability.
- 8. Inspection and Maintenance:
 - a. Periodically inspect areas of earthwork and areas where soil or soil cover are disturbed to detect evidence of the start of erosion and sedimentation; promptly implement corrective measures as required to control erosion and sedimentation. Continue inspections and corrective measures until soils are permanently stabilized and permanent vegetation has been established
 - b. Inspect not less often than the frequency indicated in Section 01 41 26, Storm Water Pollution Prevention Plan and Permit.
 - c. Repair or replace damaged erosion and sediment controls within 24 hours of CONTRACTOR becoming aware of such damage.
 - d. Periodically remove silt and sediment that has accumulated in or behind sediment and erosion controls. Properly dispose of silt and sediment.
- 9. Duration of Erosion and Sediment Controls:
 - a. Maintain erosion and sediment controls in effective working condition until the associated drainage area has been permanently stabilized.
 - b. Maintain erosion and sediment controls until the Site is restored and site improvements including landscaping, if any, are complete with underlying soils permanently stabilized.
- 10. Work Stoppage:
 - a. If the Work is temporarily stopped or suspended for any reason, CONTRACTOR shall provide additional temporary controls necessary to prevent environmental damage to the Site and adjacent areas while the Work is stopped or suspended.
- 11. Failure to Provide Adequate Controls:
 - a. In the event CONTRACTOR repeatedly fails to satisfactorily control erosion and sedimentation, OWNER reserves the right to employ outside assistance or to use OWNER's own forces for erosion and sediment control.
 - b. Cost of such work by OWNER, plus engineering and inspection costs, will be deducted from amounts due CONTRACTOR, as set-offs in accordance with the Contract Documents.

B. Erosion and Sediment Control Permit:

1. Comply with permit requirements indicated in Section 01 41 24, Permit Requirements.

C. Silt Fencing:

1. Install and maintain silt fencing in a vertical plane, at the location(s) shown or indicated in the Contract Documents and where required.
2. Locations of Silt Fencing:
 - a. Where possible, install silt fencing along contour lines so that each given run of silt fencing is at the same elevation.
 - b. On slopes, install silt fencing at intervals that do not exceed the maximum intervals indicated in the following table:

Slope (percent)	Maximum Length of Slope Above Each Silt Fence (feet)
2 and less	150
2.1 to 5	100
5.1 to 10	50
10.1 to 20	25
20.1 to 25	20
25.1 to 40	15
40.1 to 50	10

- c. Provide silt fencing around perimeter of each stockpile of topsoil, general fill material, and excavated material. Install silt fencing before expected precipitation and maintain until stockpile is removed.
 - d. Do not install silt fencing at the following types of locations:
 - 1) Area of concentrated storm water flows such as ditches, swales, or channels.
 - 2) Where rock or rocky soils prevent full and uniform anchoring of silt fencing.
 - 3) Across upstream or discharge ends of storm water piping or culverts.
3. Installation:
 - a. Securely fasten wire mesh to posts, and securely fasten filter cloth to wire mesh.
 - b. When two sections of filter cloth abut each other, fold over edges and overlap by not less than six inches and securely fasten to wire mesh.
 - c. Embed posts in the ground to the depth necessary for proper controls; embed posts to not less than 16 inches below ground.
 - d. Filter cloth and wire mesh shall extend not less than eight inches below ground and not less than 16 inches above ground.
 - e. Remove sediment accumulated at silt fencing as required. Repair and reinstall silt fencing as required.
4. Maintenance:
 - a. Do not allow formation of concentrated storm water flows on slopes above silt fencing unless so shown or indicated in the Contract Documents. If unauthorized concentrated storm water flows occur,

stabilize the slope via earthmoving and other stabilization measures as required to prevent flow of concentrated storm water flows toward silt fencing.

D. Straw Bale Dike.

1. Install straw bale dikes where shown or indicated, including in swales, along contours, and along toe of slopes.
2. Install straw bales in shallow excavation as wide as the bale and approximately four to six inches below surrounding grade.
3. Ends of straw bales shall tightly abut ends of adjacent straw bales.
4. Securely install straw bales using two support posts per straw bale, driven into the ground not less than 1.5 to two feet below bottom of straw bale. Top of post shall be flush with top of straw bale. Angle first post for each straw bale toward the previously-installed straw bale.
5. Frequently inspect straw bales and repair or replace as required. Remove accumulated silt and debris from behind straw bales.

E. Mulching and Soil Stabilization:

1. Use mulching to temporarily stabilize exposed soil and fill material.
 - a. Immediately following final grading, provide mulch and stabilize with mats or netting, or sprayed soil stabilization emulsion with fiber additive.
 - b. Application of mulching for soil stabilization shall be as follows.
 - 1) Unrotted Straw or Salt Hay: 1.5 to two tons per acre.
 - 2) Soil stabilization emulsions, when used, shall be applied in accordance with manufacturer's instructions, and shall be applied with mulch or stabilization fibers.
 - 3) Wood-fiber or Paper-fiber Application: 1,500 lbs. per acre, installed by hydroseeding.
 - c. Where mats or netting are used:
 - 1) Cover entire area to be stabilized with mats or netting.
 - 2) Provide anchoring trenches at the top and bottom of slopes to receive mats or netting. Bury at least the top and bottom ends of mat or netting, four inches or more wide, at top and bottom of slope. Tamp trench full of soil. Four inches from trench, secure mat or netting with appropriate staples spaced at intervals of 10 inches.
 - 3) Overlap adjacent strips of mat or netting by not less than four inches.

F. Protection of Storm Water Drainage Inlets and Catch Basins:

1. Protect each drainage inlet and catch basin that has the potential to receive storm water runoff from exposed soils, and does not discharge into a storm water settlement basin.
2. Install inlet filter bags inside of drainage inlet or catch basin in accordance with manufacturer's instructions. Secure inlet filter bag with the structure's grate or by other acceptable means.
3. Inlet filter bags shall not pose any obstruction above the pre-construction elevation of the drainage inlet or catch basin grate requiring barricades or flashers.

4. When removing silt and sediment from inlet filter bag, do not dump filter bag's contents into the drainage inlet or catch basin.
 5. Remove silt and sediment from inlet filter bag, or replace inlet filter bag, when inlet filter bag is not more than half full.
- G. Temporary Settlement Basin:
1. For constructing embankments comply with requirements in Division 31 Sections on earthwork, embankments, excavation, and fill.
 2. Overflow Weir and Discharge Pipe:
 - a. Install piping in accordance with manufacturer's instructions.
 - b. Install overflow weirs at elevations shown or indicated on the Drawings or approved Shop Drawings, as applicable, to avoid overtopping and overfilling of settlement basin without short-circuiting the settlement basin's hydraulic performance.
 - c. Wrap and secure geotextile material specified for silt fencing around discharge structures of temporary settlement basins
 3. Crushed Stone and Riprap: Install in accordance with Division 31 Sections on earthwork, fill, and riprap. Provide in areas of temporary settlement basin subject to erosion, and at upstream and downstream ends of discharge piping.
 4. Remove sediment when required based on accumulation of material.
 5. When temporary settlement basin is no longer required, remove the temporary settlement basin discharge weir, discharge piping, and spillway, fill the temporary settlement basin to required grade in accordance with requirements of Division 31 Section on excavation and fill, and provide landscaping in accordance with Division 32 Sections on landscaping.
- H. Filter Bag on Dewatering Pump Discharge:
1. Provide dewatering of excavations in compliance with Division 31 Sections on earthmoving, excavation, and fill.
 2. Locate filter bags and temporary pump discharge lines to avoid interfering with the public, use of private property, and OWNER's and facility manager's operations. Relocate filter bags and appurtenances when required.
 3. Filter bag discharge shall be directed to appropriate storm water drainage route. Do not discharge into roadways, driveways, access roads, parking areas, or overland. When temporary settlement basin is used, locate filter bags to discharge to temporary settlement basin when practicable.
 4. Provide filter bag on discharge of each dewatering pump drawing from an excavation.
 5. Securely attach filter bag to pump discharge pipe or hose.
 6. Maintain, clean out, and replace filter bags as required.
- I. Temporary Stone Construction Entrance:
1. Where shown on the Drawings, and where construction vehicles will regularly transit to paved surfaces from unstabilized surfaces, provide temporary stone construction entrance. CONTRACTOR vehicles shall use temporary stone construction entrances.

2. Provide temporary stone construction entrances of the width, length, and thickness shown or indicated on the Drawings. When not shown or indicated on the Drawings, temporary stone construction entrance shall be not less than 50 feet long, by 20 feet wide, by eight inches deep.
3. Installation:
 - a. Ensure that subgrade under each temporary stone construction entrance is suitably dense for the intended purpose. Suitably prepare subgrade as required for temporary stone construction entrance.
 - b. Provide on subgrade a layer of geotextile separation fabric, installed in accordance with geotextile separation fabric manufacturer's recommendations for separation.
 - c. Provide stone on installed geotextile separation fabric. Grade the stone for passage of vehicles.
4. Maintenance:
 - a. Maintain temporary stone construction entrance at not less than the minimum required thickness. Add stone as required to maintain thickness.
 - b. When upper layer of temporary stone construction entrance becomes contaminated with soil, remove the contaminated material and replace with clean stone.
 - c. Using water to wash down temporary construction entrance or paved areas onto which soil material has been tracked is unacceptable.

3.7 REMOVAL OF TEMPORARY CONTROLS

A. Removals – General:

1. Upon completion of the Work, remove temporary controls and restore Site to specified condition; if condition is not specified, restore Site to pre-construction condition.
2. After soils are permanently stabilized, remove from the Site temporary erosion and sediment controls.

+ + END OF SECTION + +

SECTION 01 57 33

SECURITY

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for security at the Site, including accessing the Site, securing the Work, temporary fencing, and other requirements.
2. CONTRACTOR shall safely guard all the Work, the Project, materials, equipment, and property from loss, theft, damage, and vandalism until Substantial Completion, unless otherwise agreed upon by the parties.
3. CONTRACTOR's duty includes safely guarding OWNER's property in vicinity of the Work and Project, and other private property in the vicinity of the Project from injury and loss in connection with performance of the Project.
4. Employ watchmen as required to provide required security and prevent unauthorized entry.
5. Costs for security required under this Section shall be paid by CONTRACTOR.
6. Make no claim against OWNER for damage resulting from trespass.
7. Remedy damage to property of OWNER and others arising from failure to furnish adequate security.
8. Provide temporary fencing in accordance with the Contract Documents.
9. CONTRACTOR's security measures shall be at least equal to those usually provided by OWNER or facility manager to protect existing facilities during normal operation.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Temporary Fencing: Submit site plan drawings showing proposed locations and extent of temporary site security fencing and each breach therein.
2. Product Data:
 - a. Temporary Fencing: Manufacturer's literature, specifications, and installation instructions for temporary site security fencing proposed.

B. Informational Submittals: Submit the following:

1. Employee Information: Submit to OWNER the following; do not submit to ENGINEER:
 - a. Format of employee background data.

- b. Background data for employees to whom identification badges will be furnished.
- c. Updated listing of personnel to whom identification badges have been issued. Submit updated listing within 24 hours of a change in the list or change in an employee's Site access status.

1.3 CONTRACTOR'S SITE ACCESS AND SECURITY PROCEDURES

- A. Comply with Section 01 55 13, Access Roads and Parking Areas.
- B. Comply with OWNER's security procedures and access restrictions at the Site throughout the Project. Comply with the following:
 - 1. Personnel Identification:
 - a. All CONTRACTOR personnel, including Subcontractors, Suppliers, and others associated with the Project shall wear, at a visible location, at all times at the Site a durable, waterproof badge bearing CONTRACTOR's name, employer (if other than CONTRACTOR), employee's name and, as applicable, employee number.
 - 2. General Provisions Regarding Personnel Identification:
 - a. Prerequisites to Issuance of Personnel Identification Badges:
 - 1) Do not issue personnel identification badge until the person receiving the badge is documented by CONTRACTOR as:
 - a) Being eligible to perform work in the jurisdiction where the Project is located.
 - b) Has received all required safety instructions, training, and equipment.
 - c) Is known to CONTRACTOR as being qualified to perform the Work to which the person will be assigned.
 - b. Listing of Personnel to Whom Badges are Issued:
 - 1) Maintain and continuously update a listing or log of all personnel to whom personnel identification badges have been issued.
 - 2) Listing or log shall indicate each person's full name, home address, personal telephone number, employer name, and employer address and telephone number.
 - 3) Submit copy of listing or to OWNER in accordance with Article 1.2 of this Section.
 - 3. Vehicle Identification:
 - a. While on-Site, all CONTRACTOR vehicles, including employee vehicles, shall display vehicle identification tag in clearly visible location on dashboard.
 - b. Vehicle tag shall be provided by the CONTRACTOR.
 - c. Vehicle tag shall include the following information: Site name, CONTRACTOR name, contract designation, vehicle license plate number and state of registration, name and employer of vehicle owner, and vehicle owner contact telephone number.
 - 4. Parking:

- a. Do not park outside of designated Work Limits. Prepare and maintain parking area as required.
- b. Personal vehicles are not allowed outside the contractor parking area.

PART 2 – PRODUCTS

2.1 TEMPORARY FENCING

- A. When security fencing or barriers are breached or temporarily removed for the Project, provide and maintain temporary security fencing equal to existing, unless otherwise specified, in manner satisfactory to ENGINEER and OWNER.

PART 3 – EXECUTION

3.1 TEMPORARY FENCING

- A. Installation:
 1. Provide temporary fencing for site security so that integrity of site security is maintained throughout the Project.
 2. Install temporary fencing used for site security in accordance with the Contract Documents and fence manufacturer's instructions.
- B. Maintenance:
 1. Maintain temporary fencing throughout the Project.
 2. Repair damage to temporary fencing and replace fencing when required to preserve Site security.
- C. Removal:
 1. Remove temporary fencing when permanent site security fencing is in place and fully functional, or when otherwise directed or ENGINEER.

+ + END OF SECTION + +

SECTION 01 58 00

PROJECT IDENTIFICATION AND SIGNS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. General CONTRACTOR shall furnish, install, and maintain temporary signage for Project identification and construction site information. Project sign shall be a 4' x 8' sign with content to be defined by the Owner.
2. Temporary signs required are indicated in Part 2 of this Section.
3. Do not display any other temporary signs, other than those specified, without prior approved of OWNER.
4. Permanent signage required under the Contract Documents is under Section 10 14 00, Signage.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Sign Painter:
 - a. Shall be a professional in the type of Work required, regularly engaged in work similar to that required.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Layout of each temporary sign, indicating layout, text, font, character size, graphics (if any), type and grade of materials, including sign board, trim, supports, and bracing.
2. Product Data:
 - a. Specifications and product data for finishes proposed for use, when requested by ENGINEER.
3. Samples: Submit color Samples when requested by ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

A. Performance Criteria:

1. Temporary signs, including supports and bracing, shall withstand sustained winds of 75 miles per hour.

- B. Temporary Signage Required: Provide the following temporary signs:
 - 1. Site Informational Signage:
 - a. Provide temporary signage as required for construction site operations and controlling traffic at the construction site. Temporary signage for controlling traffic shall comply with Section 01 55 26, Maintenance and Protection of Traffic.
- C. Materials:
 - 1. Sign Board:
 - a. Signs shall be 3/4-inch thick, exterior-grade plywood, unless otherwise shown or indicated.
 - b. Provide signs with trim, mitered on edges.
 - 2. Supports and Bracing:
 - a. Provide supports and bracing as required to adequately support and brace temporary signs to comply with the performance criteria indicated in this Section.
- D. Finishing:
 - 1. Paint sign with exterior gloss-finish enamel, suitable for long-term exposure to sunlight without fading for the duration of the Project.

PART 3 – EXECUTION

3.1 INSTALLATION, MAINTENANCE, AND REMOVAL

- A. Installation:
 - 1. Location of signs shall be as shown or indicated on the Contract Documents, or as directed by ENGINEER. Temporary signs shall be plainly visible to vehicular traffic.
 - 2. Install signs in a neat, professional, workmanlike manner to withstand the performance criteria indicated in this Section.
- B. Maintenance:
 - 1. Maintain temporary signage so that signs are clean, legible, and upright.
 - 2. Cut grass, weeds, and other plants so that temporary signs are not covered or obscured.
 - 3. Repair and repaint damaged temporary signs.
 - 4. Relocate signs as required by progress of the Project.
- C. Remove temporary signage prior to final inspection of the Work, or when directed by ENGINEER.

+ + END OF SECTION + +

SECTION 01 61 00

COMMON PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. This Section includes:
 - a. Common requirements for materials and equipment.
 - b. Compatibility of materials and equipment.

1.2 REQUIREMENTS FOR MATERIALS AND EQUIPMENT

- A. Unless otherwise indicated in the Contract Documents, furnish materials and equipment that:
 - 1. have not previously been incorporated into another project or facility; and
 - 2. have not changed ownership after initial shipment from the manufacturer's factory or facility; and
 - 3. if stored since their manufacture or fabrication, have, while in storage, been properly maintained and serviced in accordance with the manufacturer's recommendations for long-term storage; submit documentation as required by ENGINEER that such maintenance and service has been performed; and
 - 4. that the item(s) have not been subject to degradation or deterioration since manufacture; and
 - 5. are the current model(s) or type(s) furnished by the Supplier.
- B. To the extent possible, furnish from a single source those materials and equipment that are of the same generic kind.
- C. Furnish materials and equipment complete with accessories, trim, finish, fasteners, and other items shown, indicated, or required for a complete installation for the indicated use and performance.
- D. Standard Items: When available, and unless custom or nonstandard options are specified or indicated, furnish standard materials and equipment of types that have been produced and used successfully in similar situations on other projects.
- E. Visual Matching: Where required in the Contract Documents, furnish materials and equipment that match (as determined by ENGINEER) referenced existing construction, and mock-ups and Sample(s) approved by ENGINEER.
- F. Where the Contract Documents include the phrase "as selected" for color of materials or equipment, finish pattern, option, or similar phrase, provide materials and equipment selected by ENGINEER as follows:

1. Standard Range: Where the Contract Documents include the phrase “standard range of colors, patterns, textures” or similar wording, provide color, pattern, density, or texture selected by ENGINEER from manufacturer’s product line that does not include premium items.
2. Full Range: Where the Contract Documents include the phrase “full range of colors, patterns, textures” or similar wording, ENGINEER will select color, pattern, density, or texture from manufacturer’s entire product line, including standard and premium items.

1.3 COMPATIBILITY

- A. Similar materials and equipment by the same Supplier shall be compatible with each other, unless otherwise indicated in the Contract Documents or approved by ENGINEER.
- B. Provide materials and equipment compatible with items previously selected or installed on the Project.
 1. Provide materials and equipment and employ construction methods compatible with materials and equipment and construction methods of other contractors’ construction of similar or associated work.
 2. If disagreement arises between contractors over concurrently-selectable but incompatible materials or equipment, ENGINEER will determine items to be used in accordance with the Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 62 00

PRODUCT OPTIONS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. This Section includes:
 - a. CONTRACTOR's options for selecting materials and equipment.
 - b. Requirements for consideration of "or-equal" materials and equipment.

1.2 PRODUCT OPTIONS

- A. For materials and equipment specified only by reference standard or description, without reference to Supplier, furnish materials and equipment complying with such standard, by a Supplier or from a source that complies with the Contract Documents.
- B. For materials and equipment specified by naming one or more items or Suppliers, furnish the named materials and equipment that comply with the Contract Documents, unless an "or-equal" or substitute item is approved by ENGINEER.
- C. For materials and equipment specified by naming one or more items or Suppliers and the term, "or-equal", when CONTRACTOR proposes a material or equipment item or Supplier as an "or-equal", submit to ENGINEER a request for approval of an "or-equal" item or Supplier.
- D. For materials and equipment specified by naming only one item or manufacturer and followed by words indicating that no substitution is allowed, there is no option and no "or-equals" or substitution will be allowed or approved.

1.3 "OR-EQUAL" ITEMS

- A. Procedure:
 - 1. For proposed materials and equipment not named in the Contract Documents and considered as an "or-equal" in accordance with the General Conditions, CONTRACTOR shall request in writing ENGINEER's approval of the "or-equal".
 - 2. Request for approval of an "or-equal" item shall accompany the Shop Drawing or product data submittal for the proposed item
- B. Requests for approval of "or-equals" shall include:
 - 1. CONTRACTOR's written request that the proposed item be considered as an "or-equal" in accordance with the General Conditions, accompanied by CONTRACTOR's certifications required in the General Conditions.

2. Documentation adequate to demonstrate to ENGINEER that proposed item does not require extensive revisions to the Contract Documents, that proposed item is consistent with the Contract Documents, and that proposed item will produce results and performance required in the Contract Documents, and that proposed item is compatible with other portions of the Work.
3. Detailed comparison of significant qualities of proposed item with the materials and equipment and manufacturers named in the Contract Documents. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements shown or indicated.
4. Evidence that proposed item's manufacturer will furnish warranty equal to or better than that specified, if any.
5. List of similar installations for completed projects with project names and addresses, and names and address of design professionals and owners, when requested.
6. Samples, when requested by ENGINEER.
7. Other information requested by ENGINEER.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 64 00

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements and procedures for OWNER-furnished materials and equipment to be installed by CONTRACTOR.
2. CONTRACTOR shall provide labor, materials, tools, equipment, and incidentals shown, specified, and required for accepting, handling, storing as required, installing, checking out and starting-up, and completing OWNER-furnished materials and equipment.

B. Coordination:

1. Review installation procedures for OWNER-furnished materials and equipment and coordinate installation of items to be installed with or before OWNER-furnished materials and equipment.
2. Notify other contractors in advance of installing OWNER-furnished materials and equipment to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before OWNER-furnished materials and equipment.

C. Scheduling:

1. Schedule and perform the Work to coordinate with anticipated delivery dates for OWNER-furnished materials and equipment, as indicated in OWNER's procurement contracts or purchase orders therefor.
2. Where OWNER will furnish services of a manufacturer's representative for OWNER-furnished materials and equipment, schedule and perform the Work in accordance with scheduling constraints of manufacturer's representative.

1.2 OWNER-FURNISHED MATERIALS AND EQUIPMENT

A. Items of equipment and materials to be furnished and erected by OWNER for further installation by General CONTRACTOR are:

1. Pre-Engineered Metal Building (PEMB) System materials supplied and erected by ClearSpan on General CONTRACTOR provided foundation for both the garage addition and the east covered parking (lean-to) structures.
2. The scope of the PEMB system is summarized as follows:
 - a. Main frame structural steel.
 - b. Secondary framing (i.e. girts and purlins).
 - c. Anchor bolts for embedment by General CONTRACTOR at column piers.
 - d. All roofing and wall systems including panels and insulation systems.
 - e. Intake louvers.

- f. Mandoor frames and doors.
- g. Framed and rimmed openings for overhead doors and exhaust fans.
- h. Erection of the PEMB systems.

B. Delivery:

- 1. Materials and equipment indicated in Paragraph 1.2.A of this Section will be furnished F.O.B. to the Site.
- 2. OWNER-furnished materials and equipment will be available to General CONTRACTOR starting on October 17, 2024, and as required thereafter to maintain the Progress Schedule accepted by ENGINEER.

C. Availability of Procurement Documents:

- 1. A copy of the procurement contract documents under which materials and equipment were procured by OWNER (as “buyer”) are distributed with each copy of, but are not part of, the Bidding Documents.
- 2. After the Effective Date of the Contract, a copy of the procurement contract documents will be furnished to CONTRACTOR upon request without cost.

D. For OWNER-furnished materials and equipment that are not already located at or within proximity to the Site, ENGINEER will keep General CONTRACTOR informed of probable delivery date(s) of the materials and equipment included in the procurement contract.

E. OWNER’s Responsibilities:

- 1. Within ten days of the Effective Date of the Contract, arrange for and deliver to General CONTRACTOR electronic files of each of seller’s shop drawings, samples, and other submittals as reviewed by OWNER or ENGINEER (as applicable), including seller’s installation drawings.
- 2. OWNER shall confirm to General CONTRACTOR the delivery date 14 days prior to scheduled delivery.
- 3. OWNER shall arrange and pay for delivery to Site of OWNER-furnished materials and equipment.
- 4. Upon delivery, OWNER shall inspect, jointly with General CONTRACTOR, the materials and equipment delivered. Where appropriate, OWNER will arrange with seller to have seller’s representative present at the delivery point to assist in inspecting the materials and equipment delivered.
- 5. OWNER will submit to seller claims for transportation damage and shall replace damaged, defective, or deficient items of OWNER-furnished materials and equipment.
- 6. OWNER shall pay for services of seller’s factory-trained representative to furnish consultation and advice during the installation of the OWNER-furnished materials and equipment, to inspect, check, and approve installation before operation, and to furnish technical advice and direction during start-up and field testing of the OWNER-furnished materials and equipment. Extent to which services of seller’s representative will be provided during installation will be in accordance with the procurement contract documents unless determined otherwise by OWNER.

7. OWNER shall arrange for manufacturers' warranties, inspections, and services relative to OWNER-furnished materials and equipment.

F. General CONTRACTOR's Responsibilities:

1. Responsibilities for OWNER-furnished materials and equipment delivered to the Site will begin upon CONTRACTOR's commencing to unload and handle OWNER-furnished materials and equipment at that location.
2. Receive and unload at the Site OWNER-furnished materials and equipment. Provide labor, materials, equipment, tools, and incidentals for unloading. Perform unloading promptly. Pay all charges for demurrage due to negligence or delay by CONTRACTOR.
3. Inspect for completeness or damage, jointly with OWNER, and reject defective items. OWNER reserves the right to accept OWNER-furnished items rejected by CONTRACTOR and to authorize their use in the Work.
4. Indicate to OWNER signed acceptance of delivery on copy of shipping invoice.
5. Where property insurance for the Contract is furnished by CONTRACTOR, increase the amount of property insurance to be not less than that indicated in the Contract Documents plus the replacement value of OWNER-furnished materials and equipment as indicated in the property insurance requirements in the Supplementary Conditions. Furnish to OWNER copies of evidence of such revised property insurance coverage amounts.
6. Handle, store, and maintain OWNER-furnished materials and equipment.
7. Repair or replace OWNER-furnished materials and equipment that are missing, lost, or damaged after receipt by CONTRACTOR. Replacements shall be in accordance with OWNER's procurement contract documents.
8. Coordinate with seller's shop drawings, samples, and other submittals, including seller's installation drawings, reviewed and approved by OWNER or ENGINEER, as applicable.
9. Install, connect, and start up OWNER-furnished materials and equipment in accordance with manufacturer's instructions, unless otherwise specified.

1.3 HANDLING AND STORAGE

A. Handling:

1. Handle OWNER-furnished materials and equipment in accordance with the Contract Documents and the manufacturer's instructions.

B. Storage:

1. Store OWNER-furnished materials and equipment in accordance with the Contract Documents and the manufacturer's instructions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 65 00

PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for preparing for shipping, delivering, and handling materials and equipment to be incorporated into the Work.
2. CONTRACTOR shall make all arrangements for transporting, delivering, and handling of materials and equipment required for prosecution and completion of the Work.
3. When required, move stored materials and equipment without changes to the Contract Price or Contract Times.

1.2 SUBMITTALS

- A. Refer to individual Specifications Sections for submittal requirements relative to delivering and handling materials and equipment.

1.3 PREPARING FOR SHIPMENT

- A. When practical, factory-assemble materials and equipment. Mark or tag separate parts and assemblies to facilitate field-assembly. Cover machined and unpainted parts that may be damaged by the elements or climate with strippable, protective coating.
- B. Package materials and equipment to facilitate handling, and protect materials and equipment from damage during shipping, handling, and storage. Mark or tag outside of each package and crate to indicate the associated purchase order number, bill of lading number, contents by name, OWNER's contract designation, CONTRACTOR name, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.
- C. Protect materials and equipment from exposure to the elements and damage by climate, and keep thoroughly dry and dust-free at all times. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Lubricate bearings and other items requiring lubrication in accordance with manufacturer's instructions.
- D. Advance Notification of Shipments:
1. Keep ENGINEER informed of delivery of all materials and equipment to be incorporated in the Work.

2. Upon receipt of Supplier's advance notice of shipment, not less than seven days prior to delivery of materials and equipment, provide ENGINEER written notification of anticipated date and place of arrival of the following:
 - a. None.
- E. Do not ship materials and equipment until:
1. Related Shop Drawings, Samples, and other submittals required by the Contract Documents have been approved or accepted (as applicable) by ENGINEER, including, but not necessarily limited to, all Action Submittals associated with the materials and equipment being delivered.
 2. Manufacturer's instructions for handling, storing, and installing the associated materials and equipment have been submitted to and accepted by ENGINEER in accordance with the Specifications.
 3. Results of source quality control testing (factory testing), when required by the Contract Documents for the associated materials or equipment, have been submitted to and accepted by ENGINEER.
 4. Facilities required for handling materials and equipment in accordance with the Contract Documents and manufacturer's instructions are in place and available.
 5. Required storage facilities have been provided.

1.4 DELIVERY

- A. Scheduling and Timing of Deliveries:
1. Arrange deliveries of materials and equipment in accordance with the Progress Schedule accepted by ENGINEER and in ample time to facilitate inspection and observation prior to installation.
 2. Schedule deliveries to minimize space required for and duration of storage of materials and equipment at the Site or other delivery location, as applicable.
 3. Coordinate deliveries to avoid conflicting with the Work and conditions at Site, and to accommodate the following:
 - a. Work of other contractors and OWNER.
 - b. Storage space limitations.
 - c. Availability of equipment and personnel for handling materials and equipment.
 - d. OWNER's use of premises.
 4. Deliver materials and equipment to the Site during regular working hours.
 5. Deliver materials and equipment to avoid delaying the Work and the Project, including work of other contractors, as applicable. Deliver anchor system materials, including anchor bolts to be embedded in concrete or masonry, in ample time to avoid delaying the Work.
- B. Deliveries:
1. Shipments shall be delivered with CONTRACTOR's name, Subcontractor's name (if applicable), Site name, Project name, and contract designation (example: "ABC Construction Co., City of Happy Beach, Idaho,

Wastewater Treatment Plant Primary Clarifier Improvements, Contract 25, General Construction”) clearly marked.

2. Site may be listed as the “ship to” or “delivery” address; but OWNER shall not be listed as recipient of shipment unless otherwise directed in writing by ENGINEER.
3. Provide CONTRACTOR’s telephone number to shipper; do not provide OWNER’s telephone number.
4. Arrange for deliveries while CONTRACTOR’s personnel are at the Site. CONTRACTOR shall receive and coordinate shipments upon delivery. Shipments delivered to the Site when CONTRACTOR is not present will be refused by OWNER, and CONTRACTOR shall be responsible for the associated delays and additional costs, if incurred.
5. Comply with Section 01 35 43.13, Environmental Procedures for Hazardous Materials.

C. Containers and Marking:

1. Have materials and equipment delivered in manufacturer’s original, unopened, labeled containers.
2. Clearly mark partial deliveries of component parts of materials and equipment to identify materials and equipment, to allow easy accumulation of parts, and to facilitate assembly.

D. Inspection of Deliveries:

1. Immediately upon delivery, inspect shipment to verify that:
 - a. Materials and equipment comply with the Contract Documents and approved or accepted (as applicable) submittals.
 - b. Quantities are correct.
 - c. Materials and equipment are undamaged and of the required quality.
 - d. Containers and packages are intact and labels are legible.
 - e. Materials and equipment are properly protected.
2. Promptly remove damaged materials and equipment from the Site and expedite delivery of new, undamaged materials and equipment, and remedy incomplete or lost materials and equipment. Furnish materials and equipment in accordance with the Contract Documents, to avoid delaying progress of the Work.
3. Advise ENGINEER in writing when damaged, incomplete, or defective materials and equipment are delivered, and advise ENGINEER of the associated impact on the Progress Schedule.

1.5 HANDLING OF MATERIALS AND EQUIPMENT

- A. Provide equipment and personnel necessary to handle materials and equipment, including those furnished by OWNER, by methods that prevent soiling or damaging materials and equipment and packaging.

- B. Provide additional protection during handling as necessary to prevent scraping, marring, and otherwise damaging materials and equipment and surrounding surfaces.
- C. Handle materials and equipment by methods that prevent bending and overstressing.
- D. Lift heavy components only at designated lifting points.
- E. Handle materials and equipment in safe manner and as recommended by the manufacturer to prevent damage. Do not drop, roll, or skid materials and equipment off delivery vehicles or at other times during handling. Hand-carry or use suitable handling equipment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for storing and protecting materials and equipment.
2. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals to store and handle materials and equipment to be incorporated into the Work, and other materials and equipment at the Site.

1.2 STORAGE

A. Store and protect materials and equipment in accordance with manufacturer's recommendations and the Contract Documents.

B. General:

1. CONTRACTOR shall make all arrangements and provisions necessary for, and pay all costs for, storing materials and equipment.
2. Excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed to avoid injuring the Work and existing facilities and property, and so that free access is maintained at all times to all parts of the Work and to public utility installations in vicinity of the Work.
3. Store materials and equipment neatly and compactly in locations that cause minimum inconvenience to OWNER, facility manager, other contractors, public travel, and owners, tenants, and occupants of adjoining property.
4. Arrange storage in manner to allow easy access for inspection by ENGINEER and Resident Project Representative (RPR).

C. Storage Location:

1. Areas available at the Site for storing materials and equipment are shown or indicated in the Contract Documents, or as acceptable to ENGINEER.
2. Restrictions:
 - a. Do not store materials or equipment in structures being constructed unless approved by ENGINEER in writing.
 - b. Do not use lawns or other private property for storage without written permission of the owner or other person in possession or control of such premises.

D. Protection of Stored Materials:

1. Store materials and equipment to become OWNER's property to ensure

preservation of quality and fitness of the Work, including proper protection against damage by freezing, moisture, and with outdoor ambient air high temperatures as high as 120 degrees F; temperature and humidity inside crates, containers, storage sheds, and packaging may be significantly higher than the outdoor ambient air temperature.

2. Store in indoor, climate-controlled storage areas all materials and equipment subject to damage by moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to OWNER.
3. When placing orders to Suppliers for equipment and controls containing computer chips, electronics, and solid-state devices, CONTRACTOR shall obtain, coordinate, and comply with specific temperature and humidity limitations on materials and equipment, because temperature inside cabinets and components stored in warm temperatures can approach 200 degrees F.
4. CONTRACTOR shall be fully responsible for loss or damage (including theft) to stored materials and equipment.
5. Do not open manufacturer's containers until time of installation, unless recommended by the manufacturer or otherwise specified in the Contract Documents.
6. Comply with requirements of Article 1.3 of this Section.

1.3 PROTECTION – GENERAL

- A. Equipment to be incorporated into the Work shall be boxed, crated, or otherwise completely enclosed and protected during shipping, handling, and storage, in accordance with Section 01 65 00, Product Delivery Requirements.
- B. Store all materials and equipment off the ground (or floor) on raised supports such as skids or pallets.
- C. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Painted equipment surfaces that are damaged or marred shall be repainted in their entirety in accordance with equipment manufacturer and paint manufacturer requirements, to the satisfaction of ENGINEER.
- D. Protect electrical equipment, controls, and instrumentation against moisture, water damage, humidity, heat, cold, and dust. Space heaters provided in equipment shall be connected and operating at all times until equipment is placed in operation and permanently connected.

1.4 UNCOVERED STORAGE

- A. The following types of materials may be stored outdoors without cover on supports so there is no contact with the ground:
 1. Reinforcing steel.
 2. Precast concrete materials.
 3. Structural steel.
 4. Metal stairs.

5. Handrails and railings.
6. Grating.
7. Checker plate.
8. Metal access hatches.
9. Castings.
10. Fiberglass items.
11. Rigid electrical conduit, except PVC-coated conduit.
12. Piping, except PVC or chlorinated PVC (CPVC) pipe.

1.5 COVERED STORAGE

- A. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:
 1. Grout and mortar materials.
 2. Masonry units.
 3. Rough lumber.
 4. Soil materials and granular materials such as aggregate.
 5. PVC and CPVC pipe.
 6. PVC-coated electrical conduit.
 7. Filter media.
- B. Tie down covers with rope, and install covering properly sloped to prevent accumulation of water.
- C. Store loose granular materials, with covering impervious to water, in well-drained area or on solid surfaces to prevent mixing with foreign matter.

1.6 FULLY PROTECTED STORAGE

- A. Store all material and equipment not indicated in Articles 1.4 and 1.5 of this Section on supports in buildings or trailers that have concrete or wooden flooring, roof, and fully-closed walls on all sides. Covering with visquine plastic sheeting or similar material in space without floor, roof, and walls is unacceptable. Comply with the following:
 1. Provide heated storage for materials and equipment that could be damaged by low temperatures or freezing.
 2. Provide air-conditioned storage for materials and equipment that could be damaged by high temperatures or humidity.
 3. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
 4. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

1.7 HAZARDOUS MATERIALS AND EQUIPMENT

- A. Prevent contamination of personnel, storage areas, and the Site. Comply with Laws and Regulations, manufacturer's instructions, Section 01 35 43.13, Environmental

Procedures for Hazardous Materials, and other provisions of the Contract Documents.

1.8 MAINTENANCE OF STORAGE

- A. On a scheduled basis, periodically inspect stored materials and equipment to ensure that:
 - 1. Condition and status of storage facilities is adequate to provide required storage conditions.
 - 2. Required environmental conditions are maintained on continuing basis.
 - 3. Materials and equipment exposed to elements are not adversely affected.
- B. Mechanical and Electrical Equipment in Long-Term Storage:
 - 1. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer's instructions for servicing each item, with notice of enclosed instructions shown on exterior of container or packaging.
 - 2. Comply with manufacturer's instructions on scheduled basis.
 - 3. Space heaters that are part of electrical equipment shall be connected and operated continuously until equipment is placed in service and permanently connected.
 - 4. Affidavits:
 - 1. Submit to ENGINEER affidavit for each time that maintenance and inspection was performed on materials and equipment in long-term storage. Affidavit shall be signed by CONTRACTOR and entity performing the inspection and maintenance on the stored items.
 - 2. Affidavit shall indicate the date of the inspection, personnel and employer of each involved, specific stored items inspected, equipment condition, problems observed, problems corrected, maintenance tasks performed, conditions of storage environment, and other pertinent information.
 - 3. Affidavit shall include signed statement by the manufacturer of the item(s) indicating whether the storage conditions and tasks performed are suitable for continued compliance with manufacturer's warranties.

1.9 MICROPROCESSORS, PANELS, AND INSTRUMENTATION STORAGE

- A. Store control panels, microprocessor-based equipment, electronics, and other devices subject to damage or decreased useful life because of temperatures below 40 degrees F or above 100 degrees F, relative humidity above 90 percent, or exposure to rain or exposure to blowing dust in climate-controlled storage space.
- B. General:
 - 1. Storage shall be in third-party owned, bonded, insured, climate-controlled warehouse in Rockland County.
 - 2. OWNER and ENGINEER have the right to observe or inspect materials and equipment during normal working hours.
 - 3. Place inside each control panel or device a desiccant, volatile corrosion

inhibitor blocks (VCI), moisture indicator, and maximum-minimum indicating thermometer.

4. Check panels and equipment not less than once per month. Replace desiccant, VCI, and moisture indicator as often as required, or every six months, whichever occurs first.
 5. Certified record of daily maximum and minimum temperature and humidity in storage facility shall be available for inspection by OWNER and ENGINEER. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be made available to OWNER and ENGINEER upon request.
- C. Costs for storing climate-sensitive materials and equipment shall be paid by CONTRACTOR. Replace panels and devices damaged during storage, or for which storage temperatures or humidity range has been exceeded, at no additional cost to OWNER. Delays resulting from such replacement are causes within CONTRACTOR's control.
- D. Do not ship control panels and equipment to the Site until conditions at the Site are suitable for installation, including slabs and floors, walls, roofs, and environmental controls. Failure to have the Site ready for installation shall not relieve CONTRACTOR from complying with the Contract Documents.

1.10 RECORDS

- A. Keep up-to-date account of materials and equipment in storage to facilitate preparation of Applications for Payment, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 71 23

FIELD ENGINEERING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes field engineering, surveying, and layouts by CONTRACTOR, and associated requirements. This Section supplements the General Conditions' provisions on reference points and other matters.
2. CONTRACTOR shall provide field engineering services, surveying and layout services, and professional services of the types indicated for the Project, including:
 - a. Furnishing civil, structural, and other professional engineering services specified or required to execute CONTRACTOR's construction methods.
 - b. Developing and making all detail surveys and measurements required for construction; including slope stakes, batter boards, and all other working lines, elevations, and cut sheets.
 - c. Providing materials required for benchmarks, control points, batter boards, grade stakes, structure and pipeline elevation stakes, and other items.
 - d. Keeping GPS system at the Site at all times, and having a skilled instrument person available when necessary for laying out the Work.
 - e. Being solely responsible for all locations, dimensions and levels. No data other than Change Order, Work Change Directive, or Field Order shall justify departure from dimensions and levels required by the Contract Documents.
 - f. Rectifying all Work improperly installed because of not maintaining, not protecting, or removing without authorization established reference points, stakes, marks, and monuments.
 - g. Providing such facilities and assistance necessary for ENGINEER and Resident Project Representative (if any) or Owner's Site Representative (if any) to check lines and grade points placed by CONTRACTOR. Do not perform excavation or embankment work until all cross-sectioning necessary for determining payment quantities for Unit Price Work have been completed and accepted by ENGINEER.

B. Coordination:

1. Review requirements of this and other Sections and coordinate installation of items to be installed with or before field engineering, surveying, and layout Work.
2. Notify other contractors in advance of field engineering, surveying, and layout work to provide other contractors with sufficient time for installing items

- included in their contracts to be installed with or before field engineering, surveying, and layout Work.
3. Coordinate with other prime contractors in advance locations of the Work allow other prime contractors sufficient space and time for laying out work under their contracts.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Certificates:
 - a. When requested by ENGINEER, submit certificate signed by professional engineer or professional surveyor, as applicable, certifying that elevations and locations of the Work comply with the Contract Documents. Explain each deviation, if any.
2. Field Engineering:
 - a. Submit daily reports as indicated in this Section.
 - b. When requested by ENGINEER, submit documentation verifying accuracy of field engineering.
3. Surveying:
 - a. Complete plan for performing survey work, submitted not less than 10 days prior to beginning survey Work.
 - b. Example of proposed survey field books to be maintained by CONTRACTOR's surveyor. Example shall have sufficient information and detail, including example calculations and notes, to demonstrate that field books will be organized and maintained in a professional manner in accordance with the Contract Documents.
 - c. Submit original field books within two days after completing survey Work.
 - d. Submit certified survey in accordance with this Section.
4. Qualifications Statements:
 - a. Field Engineer: Name, employer, and professional address. When requested by ENGINEER, submit qualifications, including resume'.
 - b. Surveyor: Name, employer, and professional address of firm, and resumes of each professional land surveyor and crew chief that will be engaged in survey Work. Submit not less than 10 days prior to beginning survey Work. During the Project, submit resume for each new registered, licensed land surveyor and crew chief employed by or retained by CONTRACTOR not less than 10 days prior to starting on the survey Work.

1.3 CONTRACTOR'S ENGINEERS

A. Qualifications of Field Engineer:

1. Employ and retain at the Site a field engineer with experience and capability of performing all field engineering tasks required of CONTRACTOR, as indicated in this Article and elsewhere in the Contract Documents.

2. CONTRACTOR's field engineer shall possess not less than five years of experience performing duties similar in scope and extent to those required of CONTRACTOR's field engineer on this Project.
3. CONTRACTOR's field engineer shall be a registered professional engineer of discipline required for specific service on the Project, with valid license in the same jurisdiction as the Site.

B. Responsibilities of Contractor's Field Engineer:

1. Daily Reports:
 - a. Prepare and maintaining daily reports of activity on the Contract. Submit reports to ENGINEER including the following information:
 - 1) Number of employees at the Site.
 - 2) Number employees at the Site for each Subcontractor.
 - 3) Breakdown of employees by trades.
 - 4) Major equipment and materials installed as part of the Work.
 - 5) Major construction equipment utilized.
 - 6) Location of areas in which construction was performed.
 - 7) Materials and equipment delivered to the Site or suitable, offsite storage location.
 - 8) Work performed, including field quality control and testing.
 - 9) Weather conditions.
 - 10) Safety concerns, events, and precautions taken.
 - 11) Delays encountered, extent of delay incurred, reasons for the delay, and measures that will be taken to rectify delays encountered.
 - 12) Acknowledgement of specific instructions received from ENGINEER or OWNER.
 - b. Daily reports shall be signed and dated by responsible member of CONTRACTOR's staff, such as CONTRACTOR's project manager, field engineer, or superintendent, or foreman designated by CONTRACTOR as having authority to sign daily reports.
 - c. Submit CONTRACTOR's daily reports in accordance with Section 01 31 26, Electronic Communication Protocols, by 9:00 a.m. the next working day after the day covered in the associated report.
2. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for compliance with the Contract Documents.
3. Continually inspect the Work to ensure that the quality and quantities required by the Contract Documents are provided.
4. Cooperate as required with ENGINEER and Resident Project Representative (if any) in observing the Work and performing field inspections.
5. Check and coordinate the Work for conflicts and interferences, and immediately advise ENGINEER and Resident Project Representative, if any, of all discrepancies of which CONTRACTOR is aware.
6. Maintain field office files and drawings, record documents, and coordinate field engineering services with Subcontractors and Suppliers as appropriate, and other prime contractors (if any).
7. Prepare layout and coordination drawings for construction operations.

8. Review and coordinate the Work with Shop Drawings and CONTRACTOR's other submittals approved or accepted, as applicable, by ENGINEER.
- C. Professionals Retained by Contractor (whether or not stationed at the Site):
1. Delegated Professional Design Services:
 - a. Where the Contract Documents require CONTRACTOR to furnish professional engineering or architecture services as delegated professional design, the provisions of the General Conditions regarding delegated professional design services, and the Contract Documents' requirements applicable to the specific delegated professional design, shall apply.
 2. Professional Services that are Not Delegated Professional Design of the Completed Work:
 - a. Where the Contract Documents require that CONTRACTOR retain a design professional for to carry out CONTRACTOR's responsibilities for construction means, methods, techniques, sequences and procedures (including temporary construction that will not remain as part of the completed Work), such services shall be performed by a registered professional of the discipline required for specific service on the Project, with valid license in the same jurisdiction as the Site.
 - b. OWNER and ENGINEER shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed by such design professionals.

1.4 CONTRACTOR'S SURVEYOR

- A. Qualifications:
1. Employ or retain the services, as needed, at the Site a surveyor with experience and capability of performing surveying and layout tasks required in the Contract Documents and as required for the Work.
 2. CONTRACTOR's surveyor shall possess not less than five years of experience performing duties similar in scope and extent to those required of CONTRACTOR's surveyor on this Project.
 3. Surveyor shall be a professional land surveyor registered and licensed in the jurisdiction where the Project is located, or a professional engineer registered and licensed as a professional engineer in the jurisdiction where the Project is located and authorized under Laws and Regulations to practice surveying.
- B. Responsibilities of Contractor's Surveyor:
1. Providing required surveying equipment, including transit, theodolite, or total station; level; stakes; and surveying accessories.
 2. Establishing required lines and grades for constructing all facilities, structures, pipelines, and site improvements, including outdoor electrical equipment and feeders.
 3. Preparing and maintaining professional-quality, accurate, well-organized, legible notes of all measurements and calculations made while surveying and laying out the Work.

4. Prior to backfilling operations, survey, locate, and record on a copy of the Contract Documents accurate representation of buried Work and Underground Facilities provided and encountered.
5. Locating on a site plan of the Site the actual location of above-ground Work to be indicated on record documents.
6. Complying with requirements of the Contract Documents relative to surveying and related Work, including requirements of this Section's Articles 1.5 and 3.1.

1.5 RECORDS

A. Records – General:

1. Maintain at the Site a complete and accurate log of control and survey Work as such Work progresses.

B. Field Books and Records:

1. Survey data and records shall be in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the locality where the Site is located.
2. Original field notes, computations, and other surveying data shall be recorded by CONTRACTOR's surveyor in CONTRACTOR-furnished hard-bound field books, and shall be signed and sealed by CONTRACTOR's surveyor.
3. Completeness and accuracy of survey Work, and completeness and accuracy of survey records, including field books, shall be responsibility of CONTRACTOR.
4. Failure to organize and maintain survey records in an appropriate manner that allows reasonable and independent verification of calculations, and to allow identification of elevations, dimensions, and grades of the Work, shall be cause for rejecting the survey records, including field books.
5. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by ENGINEER.

C. Certified Survey of Surface Structures:

1. Upon completion of foundation walls and major site improvements, prepare a certified survey, signed and sealed by professional surveyor, showing or indicating dimensions, locations, angles and elevations of construction and locations and elevations of Underground Facilities installed and encountered during the Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SURVEYING

A. Reference Points:

1. Refer the General Conditions, as may be modified by the Supplementary Conditions, for requirements regarding reference points.
2. OWNER's established reference points that are damaged or destroyed by CONTRACTOR will be re-established by OWNER at CONTRACTOR's expense. OWNER may deduct from payments owed CONTRACTOR such amounts as set-offs in accordance with the Contract Documents.
3. From OWNER-established reference points, establish lines, grades, and elevations necessary to control the Work. Obtain measurements required for executing the Work to tolerances specified in the Contract Documents.
4. Establish, place, and replace as required, such additional stakes, markers, and other reference points necessary for control, intermediate checks, and guidance of construction operations.

B. Surveys to Determine Quantities for Payment:

1. For each application for progress payment, perform such surveys and computations necessary to determine quantities of Work performed or placed. Perform surveys necessary for ENGINEER to determine final quantities of Work in place.
2. Notify ENGINEER not less than 24 hours before performing survey services for determining quantities to be included in Application for Payment. Unless waived in writing by ENGINEER, perform quantity surveys in presence of ENGINEER or Resident Project Representative (if any).

C. Construction Surveying: Comply with the following:

1. Alignment Staking: Provide alignment stakes at 50-foot intervals on tangent, and at 25-foot intervals on curves.
2. Slope Staking: Provide slope staking at 50-foot intervals on tangent, and at 25-foot intervals on curves. Re-stake at every ten-foot difference in elevation.
3. Structure: Stake-out structures, including elevations, and check prior to and during construction.
4. Pipelines: Stake-out pipelines including elevations, and check prior to and during construction.
5. Roads, Drives, and Paved Areas: Stake-out roadway, driveway, and paved area elevations at 50-foot intervals on tangent, and at 25-foot intervals on curves.
6. Cross-sections: Provide original, intermediate, and final staking as required, for site work other locations as necessary for quantity surveys.
7. Easement Staking: Provide easement staking at 50-foot intervals on tangent, and at 25-foot intervals on curves. Also provide wooden laths with flagging at maximum intervals of 100 feet.
8. Record Staking: Provide permanent stake at each blind flange and each utility cap provided for future connections. Stakes for record staking shall be material acceptable to ENGINEER.

D. Accuracy:

1. Establish CONTRACTOR's temporary survey references points for CONTRACTOR's use to not greater than second-order accuracy (e.g., 1:10000). Construction staking used as a guide for the Work shall be set at not greater than third-order accuracy (e.g., 1:5000). Basis on which such orders are established shall provide the absolute margin for error specified below.
2. Horizontal accuracy of easement staking shall be plus or minus 0.1 feet. Accuracy of other staking shall be plus or minus 0.04 feet horizontally and plus or minus 0.02 feet vertically.
3. Survey calculations shall include an error analysis sufficient to demonstrate required accuracy.

+ + END OF SECTION + +

SECTION 01 71 33

PROTECTION OF THE WORK AND PROPERTY

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for safety and protection that augment the requirements of the General Conditions, as may be modified by the Supplementary Conditions. This Section also includes requirements for barricades and warning signals, and protection of trees and plants, existing structures, floors, roofs, installed items, and landscaping.
2. CONTRACTOR shall be responsible for taking all precautions, providing all programs, and taking all actions necessary to protect personnel health and safety, and to protect the Work and all public and private property and facilities from damage, as specified in the General Conditions, Supplementary Conditions, and the Specifications.
3. To prevent damage, injury, or loss, CONTRACTOR's actions shall include the following:
 - a. Provide measures for safety of personnel at the Site, including workers engaged in the Work, delivery personnel, testing and inspection personnel, personnel of authorities having jurisdiction, other visitors to the Site, the public, OWNER's personnel, facility manager's personnel (if different from OWNER), ENGINEER, and Resident Project Representative (if any).
 - b. Storing apparatus, materials, supplies, and equipment in an orderly, safe manner that does not unduly interfere with progress of the Work or work of other contractors, utility owners, and owners of transportation rights-of-way.
 - c. Providing suitable storage facilities for materials and equipment subject to damage or degradation by exposure to climate, temperature, theft, breakage, or other cause.
 - d. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction.
 - e. Frequently removing and disposing of refuse, rubbish, scrap materials, and debris caused by CONTRACTOR's operations so that, at all times, the Site is safe, orderly, and workmanlike in appearance.
 - f. Providing temporary barricades, fencing, and guard rails around the following: openings, scaffolding, temporary stairs and ramps, around excavations, for elevated walkways, and other areas that may present a fall-hazard or hazard to vehicles.
4. Do not, except after written consent from proper parties, enter or occupy privately-owned property or premises with personnel, tools, materials or equipment, except on lands and easements provided by OWNER.

5. CONTRACTOR has full responsibility for preserving public and private property and facilities on and adjacent to the Site. Direct or indirect damage done by, or on account of, any act, omission, neglect, or misconduct by CONTRACTOR in executing the Work, shall be remedied by CONTRACTOR, at his expense, to condition equal to that existing before damage was done.
6. Owner May Remedy:
 - a. Should CONTRACTOR fail to protect and safeguard property and the Work after requests from ENGINEER or OWNER, OWNER may implement measures to protect property and the Work.
 - b. Cost of such OWNER-implemented measures shall be paid by CONTRACTOR. OWNER may deduct from payments due CONTRACTOR such amounts as set-offs in accordance with the Contract Documents.
 - c. Such right, however, shall not result in any obligation by OWNER or ENGINEER to continuously monitor or have responsibility for protection of property and the Work, which responsibility is exclusively CONTRACTOR's.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 BARRICADES AND WARNING SIGNALS

- A. Barricades and Warning Signals – General:
 1. Where the Work is performed on or adjacent to roadway, access road or driveway, right-of-way, or public place:
 - a. Provide temporary barricades, fences, lights, warning signs, danger signals, watchmen, and take other precautionary measures for protecting persons, property, and the Work.
 - b. Use appropriately colored and reflective barricades, or paint barricades accordingly, to be visible at night.
 - c. From sunset to sunrise, provide and maintain not less than one temporary light at each barricade.
 - d. Erect sufficient barricades to keep vehicles from being driven on or into Work under construction.
 - e. Furnish watchmen in sufficient numbers to protect the Work.
 2. Provide temporary barricades to protect personnel and property for Work not in or adjacent to transportation routes and vehicular travel areas, including indoor work, in accordance with Laws and Regulations.
 3. CONTRACTOR's responsibility for maintaining temporary barricades, signs, lights, and for providing watchmen shall continue until the Work is substantially complete in accordance with the Contract Documents, unless other provision for security and protection is agreed to by the parties. After

Substantial Completion, protect Work and property during periods when final Work or corrective Work is underway.

- B. Temporary Fencing: Refer to Section 01 57 33, Security.

3.2 TREE AND PLANT PROTECTION

A. Tree and Plant Protection – General:

1. Protect existing trees, shrubs, and plants on or adjacent to the Site, shown or designated to remain in place, against unnecessary cutting, breaking, damage, or skinning of trunk, branches, bark, and roots.
2. Do not store materials or equipment or park construction equipment and vehicles within foliage drip lines.
3. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.
4. Open fires are not allowed onsite.
5. Within the limits of the Work, water trees and plants that are to remain to maintain their health during construction operations.
6. Cover exposed roots with burlap, and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, runoff, and noxious materials in solution.
7. If branches or trunks are damaged, prune branches immediately and protect cut or damaged areas with emulsified asphalt compounded specifically for horticultural use, in manner acceptable to ENGINEER.
8. When directed by ENGINEER, remove and dispose of at location away from the Site damaged trees and plants that die or suffer permanent injury, and replace each damaged tree or plant with specimen of equal or better species and quality.

3.3 PROTECTION OF EXISTING STRUCTURES

A. Underground Facilities:

1. Underground Facilities known to OWNER and ENGINEER, except water, gas, sewer, electric, and communications services to individual buildings and properties, are shown. Information shown for Underground Facilities is the best available to OWNER and ENGINEER but, in accordance with the General Conditions, as may be modified by the Supplementary Conditions, is not guaranteed to be correct or complete.
2. CONTRACTOR shall explore ahead of trenching and excavating Work and shall sufficiently uncover Underground Facilities that will or may interfere with the Work to determine their location, to prevent damage to Underground Facilities, and to prevent service interruption to structures and properties served by Underground Facilities. If CONTRACTOR damages an Underground Facility, CONTRACTOR shall restore it to its pre-construction condition, in accordance with requirements of the owner of the damaged facility and the Contract Documents.

3. Necessary changes in the location of the Work may be directed by ENGINEER to avoid Underground Facilities not shown or indicated on the Contract Documents.
 4. If permanent relocation of an existing Underground Facilities is required and is not otherwise shown or indicated in the Contract Documents, CONTRACTOR may be directed in writing to perform the required work. When such relocation Work results in a change in the Contract Price, Contract Times, the associated Contract modification procedures and payment for such Work shall be in accordance with the Contract Documents.
- B. Surface Structures:
1. Surface structures are existing buildings, structures, and other facilities at or above ground surface, including their foundations and any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage routes, exposed piping and utilities, poles, exposed wires, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.
 2. Existing surface facilities, including but not limited to guard rails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored to their pre-construction condition at CONTRACTOR's expense.
- C. Protection of Underground Facilities and Surface Structures:
1. CONTRACTOR shall sustain in their places and protect from direct or indirect injury all Underground Facilities and surface structures located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.
 2. Before proceeding with the Work of sustaining and supporting such structure or facility, CONTRACTOR shall satisfy ENGINEER that methods and procedures to be used have been approved by party owning same.
 3. CONTRACTOR shall bear all risks attending the presence or proximity of all Underground Facilities and surface structures within or adjacent to limits of the Work, in accordance with the Contract Documents.
 4. CONTRACTOR shall be responsible for damage and expense for direct or indirect injury, caused by CONTRACTOR's activities, to structures and facilities. CONTRACTOR shall promptly repair damage caused by CONTRACTOR's activities, to the satisfaction of owner of damaged structure or facility.
 5. Protection of Underground Facilities Under Roads and Parking Areas: Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and other Underground Facilities near to or visible at the ground surface.

3.4 PROTECTION OF FLOORS AND ROOFS

A. Protection of Floors and Roofs – General:

1. Use proper protective covering when moving equipment, handling materials or other loads, when painting, handling mortar or grout, and when cleaning walls, ceilings, or structure contents.
2. Use metal pans to collect oil and cuttings from piping, conduits, and rod threading machines, and under metal cutting machines.
3. Do not load concrete floors less than 28 days old without written permission of ENGINEER. Do not load floors, roofs, or slabs in excess of design loading.
4. Do not load roofs without written permission of ENGINEER.
5. Restrict access to roofs, and keep CONTRACTOR personnel off existing roofs, except as required for the Work.
6. If access to roofs is required, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood or other acceptable means.

3.5 PROTECTION OF INSTALLED MATERIALS, EQUIPMENT, AND LANDSCAPING

- A. Protect installed Work to prevent damage from subsequent operations. Remove protective items when no longer needed, prior to Substantial Completion of the Work.
- B. Control traffic to prevent damage to equipment, materials, and surfaces.
- C. Coverings:
 1. Provide temporary coverings to protect materials and equipment from damage.
 2. Cover projections, wall corners and jambs, sills, and soffits of openings, in areas used for traffic and for passage of materials and equipment in subsequent work.

+ + END OF SECTION + +

SECTION 01 73 19

INSTALLATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section describes general requirements for installing materials and equipment. Additional installation requirements are included in the various Specifications Sections in Divisions 02 through 49 and elsewhere in the Contract Documents.
2. CONTRACTOR shall provide all labor, materials, equipment, services, tools, and incidentals required to install materials and equipment.

1.2 QUALITY ASSURANCE

A. General:

1. Provide appropriate quality assurance for installing materials and equipment, and provide quality control over Suppliers, materials and equipment, services, Site conditions, and workmanship, to provide Work of the required quality.

B. Qualifications:

1. Installer:
 - a. Installers shall be experienced in the types of Work required, including, but not limited to, the requirements of Section 01 42 00, References, and the Division 02 through 49 Specifications where the particular element of the Work is specified.

C. Regulatory Requirements: Comply with the following:

1. 29 CFR 1910, OSHA.

PART 2 – PRODUCTS

2.1 EQUIPMENT DRIVE GUARDS

A. Equipment Drive Guards – General:

1. Unless otherwise shown or indicated, provide all-metal guards complying with 29 CFR 1910, Subpart O, with equipment driven by open shafts, belts, chains, pulleys, sheaves, or gears. Guards shall enclose drive and driven mechanism.
2. If material of guards are not otherwise specified, guards shall be galvanized sheet steel, galvanized woven wire, or expanded metal set in a frame of galvanized steel members, as appropriate.

3. Secure guards in position by steel braces or straps, securely fastened to frame of equipment, floor, or wall as required.
4. Fastenings shall allow removal of guards for servicing equipment.

2.2 MISCELLANEOUS MATERIALS

- A. Shims shall be Type 304L stainless steel, clean and free of slag.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 1. Installation Instructions and Requirements:
 - a. Install materials and equipment in accordance with approved Shop Drawings and CONTRACTOR's other submittals approved by ENGINEER, the Contract Documents, and manufacturer's installation instructions. When manufacturer's installation instructions conflict with the Contract Documents, obtain interpretation or clarification from ENGINEER before proceeding.
 - b. Manufacturer's installation instructions include manufacturer's written instructions; drawings; illustrative, wiring and schematic diagrams; diagrams identifying external connections, terminal block numbers and internal wiring; and other such information pertaining to installation of materials and equipment. Included are all of manufacturer's printed installation instructions, including those that may be attached to equipment upon delivery.
 2. Prior to installing materials and equipment, complete preparation of surfaces on which materials and equipment are to be installed. Prior to installing materials and equipment on new concrete, concrete shall achieve sufficient compressive strength to support the materials and equipment.
 3. Maintain the work area in a broom-clean condition while installing materials and equipment.
 4. Use proper tools to assemble materials and equipment. Do not deform or mar surface of shafts, nuts, and other parts.
 5. Do not support rigging from building or structure without written permission of ENGINEER. CONTRACTOR is responsible for and shall repair damage to building or structure resulting from CONTRACTOR's operations, in accordance with Section 01 71 33, Protection of the Work and Property.
 6. During installation, maintain materials and equipment in neutral position and do not exert undue stress on materials and equipment.
 7. Tighten connections requiring gaskets evenly all around to ensure uniform stress over entire gasket.
 8. Use only an oil bath heater to expand couplings, gears, and other mechanical components to be expanded for installation. Do not force or drive couplings,

gears, and other mechanical components onto equipment shafts, or subject such items to open flame or torch.

9. Do not alter or repair materials and equipment and do not burn or weld materials and equipment unless required in the Contract Documents or allowed by ENGINEER.
10. Provide plugs in lubrication holes to prevent entry of foreign matter.

B. Setting and Erection:

1. Install materials and equipment plumb, level, true, and free of rack unless otherwise shown or indicated, and demonstrate plumbness and level to ENGINEER. Bring parts to proper bearing after installation and erection.
2. Anchorages:
 - a. Provide anchorage setting drawings in time to coordinate with fabrication of materials and equipment and the Work.
 - b. Anchorages shall comply with Section 05 05 33, Anchor Systems. Requests for approval of substitute materials or methods of anchorage shall be in accordance with the General Conditions, Supplementary Conditions, and Section 01 25 00, Substitution Procedures.
3. Shimming:
 - a. Wedging is not allowed.
 - b. During installation, use the minimum number of shims required for leveling the equipment.
 - c. Provide shims, filling pieces, keys, packing, grouting of the type required by the Contract Documents, and other materials and equipment necessary to properly align, level, and secure apparatus in place.
4. Installing Equipment onto Foundations:
 - a. Using experienced millwrights, carefully set and align equipment on foundations, after equipment soleplates or baseplates (as applicable) have been shimmed to true alignment at anchorages.
 - b. Set anchorages in place and tighten nuts against shims.
 - c. Check bedplates or wing feet of equipment after securing to foundations and, after confirming alignments, grout soleplates or baseplates (as applicable) in place in accordance with the Contract Documents.
5. Ream misaligned holes. Do not “force” bolts or keys.
6. Where applicable, properly align equipment with associated piping and utility connections, without exerting undue stress on connecting piping and utilities.

C. Alignment and Leveling:

1. Verify that all shafts, couplings, and sheaves are properly aligned and adjust to required tolerances.
2. Align couplings while equipment is free of external loads.
3. Check angular and parallel alignment and record actual alignment and submit to ENGINEER. Alignment shall be within tolerances specified in Contract Documents and as recommended by Supplier of the material or equipment item.
4. Use laser indicators or dial indicators for checking angular and parallel alignment. Using dial indicators requires that, during rotation of half-couplings

in performing testing, dial indicator shall be maintained in same relative position, and dial indicator readings taken at same place on circumference of coupling.

D. Threaded Connections:

1. Apply a molybdenum disulfide, anti-seize compound to threads in mechanical connections such as bolts, studs, cap screws, tubing, and other threads, unless otherwise shown or indicated.

3.2 FIELD QUALITY CONTROL

A. Supplier's Services:

1. When specified, provide competent, qualified representatives of material or equipment Supplier to perform services required, including: supervising installation, checking the completed installation, adjusting, testing of materials and equipment, and where required instructing operations and maintenance personnel in the use and care of materials and equipment.

+ + END OF SECTION + +

SECTION 01 73 24

CONNECTIONS TO EXISTING FACILITIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for connections to existing facilities. Requirements for tie-ins and shutdowns necessary to complete the Work are in Section 01 14 16, Coordination with Owner's Operations.
2. CONTRACTOR shall provide labor, materials, tools, equipment, and incidentals shown, specified, and required for performing connections to existing facilities.

B. Coordination:

1. Review installation procedures under other Sections and coordinate Work that will be performed with or before the Work specified in this Section.
2. Notify other contractors in advance of Work for connections to existing facilities to provide other contractors sufficient time for work included in their contracts that will be installed with or before Work specified in this Section.

C. Related Sections:

1. Section 01 14 16, Coordination with Owner's Operations.
2. Section 01 73 29, Cutting and Patching.

D. General:

1. Requirements for shutdowns, tie-ins, and other provisions on connections to existing facilities, are indicated in Section 01 14 16, Coordination with Owner's Operations.
2. Requirements for temporary pumping for connections to existing facilities are in Section 01 14 16, Coordination with Owner's Operations.
3. Requirements for cutting and patching are in Section 01 73 29, Cutting and Patching.
4. To extent possible, materials, equipment, systems, piping, and appurtenances that will be placed into service upon completion of connection to existing facilities shall be checked, successfully tested, and in condition for operation prior to making connections to existing facilities, if valves, gates, or similar watertight and gastight isolation devices are not provided at the connection point.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes general requirements for cutting and patching Work.
2. CONTRACTOR shall perform cutting and coring, and rough and finish patching of holes and openings in existing construction.
3. Provide cutting, coring, fitting and patching, including attendant excavation and fill, required to complete the Work, and to:
 - a. remove and replace defective Work;
 - b. remove samples of installed Work as specified or required for testing;
 - c. remove construction required to perform required alterations or additions to existing construction;
 - d. uncover the Work for ENGINEER's observation of covered Work, testing or inspection by testing entities, or observation by authorities having jurisdiction;
 - e. connect to completed Work not performed in proper sequence;
 - f. remove or relocate existing utilities and piping that obstruct the Work in locations where connections are to be made;
 - g. make connections or alterations to existing or new facilities.

B. Coordination:

1. Cutting, coring, and rough patching shall be performed by the prime contractor requiring the opening. Finish patching shall be responsibility of General CONTRACTOR and shall be performed by trade associated with application of the particular finish.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:

1. Cutting and Patching Request:
 - a. Submit written request to ENGINEER, well in advance of executing cutting or alteration that affects one or more of the following:
 - 1) Design function or intent of Project.
 - 2) Work of OWNER or other contractors.
 - 3) Structural value or integrity of an element of the Project.
 - 4) Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 5) Efficiency, operational life, maintenance, or safety of operational elements.
 - 6) Visual qualities of sight-exposed elements.
 - b. Request shall include:

- 1) Identification of Project and Contract designation.
 - 2) Description of affected Work of CONTRACTOR and work of others (if any).
 - 3) Necessity for cutting.
 - 4) Effect on work or operations of OWNER, other contractors (if any), and on structural or weatherproof integrity of Project.
 - 5) Description of proposed Work, describing: scope of cutting and patching; trades who will be executing the Work; materials and equipment to be used; extent of refinishing; schedule of operations; alternatives to cutting and patching, if any, and net effect on aesthetics following completion of finishing Work.
 - 7) Designation of entity responsible for cost of cutting and patching, when applicable.
 - 8) Written permission of other prime contractors (if any) whose work will or may be affected.
2. Recommendation Regarding Cutting and Patching:
 - a. Should conditions of work or schedule indicate a change of materials or methods, submit written recommendation to ENGINEER including:
 - 1) Conditions indicating change.
 - 2) Recommendations for alternative materials or methods.
 - 3) Items required with request for approval of substitute, in accordance with the substitution request requirements of the Contract Documents.
 3. Product Data:
 - a. Submit manufacturer's data for the protective compound to be applied to core-drilled surfaces and cut concrete surfaces.
 - b. When not required under other Sections, submit manufacturer's data on materials to be used for finishing around the cut or patched area.
 - c. Furnish submittals for patching materials under the associated Specifications Section.
- B. Informational Submittals: Submit the following:
1. Written Notification of Cutting and Patching:
 - a. Submit written indication designating the day and time that the construction associated with cutting and patching will be uncovered to allow for observation. Do not begin cutting or patching operations until submittal is accepted by ENGINEER.
 2. X-ray Investigations:
 - a. Proposed method of investigation. Submit and obtain ENGINEER's acceptance prior to performing X-ray inspections.
 - b. Report of X-ray evaluation of slabs, floors, and walls to be cut or core-drilled.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Materials - General:
 - 1. Use materials that comply with the Contract Documents.
 - 2. If not shown or indicated in the Contract Documents, use materials that are identical to existing materials affected by cutting and patching Work.
 - 3. For exposed surfaces, use materials that visually match existing adjacent surfaces to fullest extent possible. If identical materials are unavailable or cannot be used, use materials whose installed performance will equal or surpass that of existing materials.
 - 4. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, using materials that do not void required or existing warranties.
- B. Compound Applied to Core-Drilled Surfaces and Cut Concrete Surfaces:
 - 1. After core-drilling and before installing the utility or equipment through the penetration, coat exposed concrete and steel with solvent-free, two-component, protective, epoxy resin coating.
 - 2. Color shall approximate the finish color of the existing surface to be coated.
 - 3. Product and Manufacturer: Provide one of the following:
 - a. Sikagard 62, by Sika Corporation.
 - b. Or equal.

PART 3 – EXECUTION

3.1 GENERAL

- A. Perform cutting and coring in such manner that limits extent of patching required.
- B. Structural Elements:
 - 1. Do not cut or patch structural elements in manner that would change the element's structural load-carrying capacity as load deflection ratio.
- C. Operating Elements:
 - 1. Do not cut or patch operating elements in manner that would reduce their capacity to perform as intended.
 - 2. Do not cut or patch operating elements or related components in manner that would increase maintenance requirements or decrease operational life or safety.
- D. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, using methods that do not void required or existing warranties.

3.2 INSPECTION

- A. Examine surfaces to be cut or patched, and conditions under which cutting or patching will be performed before starting cutting or patching Work.
- B. Report unsatisfactory or questionable conditions to ENGINEER in writing. Do not proceed with cutting or patching Work until unsatisfactory conditions are corrected.

- C. Non-Destructive Investigation:
 - 1. In advance of cutting or coring through existing slabs or walls, use X-ray or other non-destructive methods accepted by ENGINEER to determine location of reinforcing steel, electrical conduits, and other items embedded in slabs or walls.
 - 2. Submit to ENGINEER written report of findings of evaluation.
 - 3. Perform X-ray investigation and submit results to ENGINEER sufficiently in advance of cutting Work to allow time to identify and implement alternatives, if changes to the Work are necessary because of conduit or other features in floor or wall.

3.3 PREPARATION

- A. Provide temporary support required to maintain structural integrity of facilities, to protect adjacent work from damage during cutting, and to support the element(s) to be cut.
- B. Protection of Existing Construction during Cutting and Patching:
 - 1. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project and facility that will be exposed during cutting and patching operations.
 - 2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
 - 3. Do not cut existing pipe, conduit, ductwork, or other utilities serving facilities scheduled to be removed or relocated until provisions have been made to bypass them.

3.4 CORING

- A. Use core-drilling to make penetrations through concrete and masonry walls, slabs, or arches, unless otherwise accepted by ENGINEER in writing.
- B. Coring:
 - 1. Perform coring with non-impact rotary tool using diamond core-drills. Size holes for pipe, conduit, sleeves, equipment or mechanical seals, as required, to be installed through the penetration.
 - 2. Do not core-drill through electrical conduit or other utilities embedded in walls or slabs without approval of ENGINEER. To extent possible, avoid cutting reinforcing steel in slabs and walls.
- C. Protection:
 - 1. Protect existing equipment, utilities, and adjacent areas from water and other damage caused by or resulting from core-drilling operations.
 - 2. After core-drilling and before installing the utility or equipment through the penetration, coat exposed concrete and steel with protective coating material indicated in Paragraph 2.1.B of this Section. Apply protective coating in accordance with manufacturer's instructions.

D. Cleaning:

1. After core-drilling, vacuum or otherwise remove slurry and tailings from the work area.

3.5 CUTTING

A. Cutting – General:

1. Cut existing construction using methods least-likely to damage elements retained and adjoining construction and that provide proper surfaces to receive subsequent installation or repair.
2. In general, use hand tools or small power tools suitable for sawing or grinding. When possible, avoid using hammering and avoid chopping.
3. Cut holes and slots as small as possible, neatly to the size required, and with minimum disturbance of adjacent surfaces.
4. Prior to starting to cut, provide adequate bracing of area to be cut.
5. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed side.
6. Provide equipment of adequate size to remove the cut panel or “coupon”.
7. Provide temporary covering over cut openings where not in use.

B. Cutting – Concrete and Masonry:

1. Cut through concrete and masonry using concrete wall saw with diamond saw blades.
2. On both of the element being cut, provide for control of slurry generated during sawing.
3. After cutting concrete and before installing subsequent construction on or through the opening, coat exposed concrete and steel with protective coating material indicated in Paragraph 2.1.B of this Section. Apply protective coating in accordance with manufacturer’s instructions.

3.6 PATCHING

A. Patching – General:

1. Patch construction by filling, repairing, refinishing, closing-up, and similar operations following performance of other Work.
2. Patch with durable seams that are as inconspicuous as possible. Provide materials and comply with installation requirements indicated in the Contract Documents.
3. Patch to provide airtight and watertight connections to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
4. Where feasible, test patched areas to demonstrate integrity of installation.

B. Restoration:

1. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in manner that eliminates evidence of patching and refinishing.
2. For continuous surfaces, refinish to nearest intersection.
3. For an assembly, refinish the entire unit that was patched.

4. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 CLEANING

A. Cleaning and Restoration:

1. Clean areas and spaces where cutting, coring, or patching were performed.
2. Clean piping, conduit, and similar constructions before applying paint or other finishing materials.
3. Restore damaged coverings of pipe and other utilities to original condition.

+ + END OF SECTION + +

SECTION 01 74 05

CLEANING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for keeping the Site free of accumulations of waste materials during construction (“progress cleaning”) and cleaning for Substantial Completion and prior to final inspection (collectively, “closeout cleaning”).
2. CONTRACTOR shall perform cleaning during the Project, including progress cleaning, upon completion of the Work, and as required by the General Conditions, as may be modified by the Supplementary Conditions, and this Section.
3. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. NFPA 241, Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROGRESS CLEANING

A. General:

1. Clean the Site, work areas, and other areas occupied by CONTRACTOR not less than weekly. Dispose of materials in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and the following:
 - a. Comply with NFPA 241 for removing combustible waste materials and debris.
 - b. Do not hold non-combustible materials at the Site more than three days if the temperature is expected to rise above 80 degrees F. When temperature is less than 80 degrees F, dispose of non-combustible materials within seven days of their generation.
 - c. Provide suitable containers for storage of waste materials and debris.

- d. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.
- B. Site:
 - 1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
 - 2. Not less than weekly, brush-sweep roadways and paved areas at the Site that are used by construction vehicles or otherwise affected by construction activities.
 - 3. Comply with dust control requirements of Section 01 57 05, Temporary Controls, and Section 01 41 27, Earthmoving Permit and Dust Control.
- C. Work Areas:
 - 1. Clean areas where the Work is in progress to maintain the extent of cleanliness necessary for proper execution of the Work.
 - 2. Remove liquid spills promptly. Immediately report spills to OWNER, ENGINEER, and authorities having jurisdiction, in accordance with the Contract Documents and Laws and Regulations.
 - 3. Where dust would impair proper execution of the Work, broom-clean or vacuum entire work area, as appropriate.
 - 4. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- D. Installed Work:
 - 1. Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of material or equipment installed, using only cleaning agents and methods specifically recommended by material or equipment manufacturer. If manufacturer does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage exposed surfaces.
- E. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.
- F. Cutting and Patching:
 - 1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, trailings and cuttings, and similar materials.
 - 2. Thoroughly clean piping, conduits, and similar features before applying patching material, paint, or other finishing materials. Restore damaged coverings on piping, ducting, and similar items to its pre-construction condition.
- G. Cleaning of Hydraulic Structures: Clean hydraulic structures that will contain fluid, such as tanks and channels, in accordance with this Section and Section 01 45 53, Cleaning, Testing, and Disinfecting Hydraulic Structures.
- H. Waste Disposal:

1. Properly dispose of waste materials, surplus materials, debris, and rubbish off the Site.
 2. Do not burn or bury rubbish and waste materials at the Site.
 3. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers or sanitary sewers.
 4. Do not discharge wastes into surface waters or drainage routes.
 5. CONTRACTOR is solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste generated by CONTRACTOR's operations or brought to the Site by CONTRACTOR.
- I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where required for protection from damage or deterioration, until Substantial Completion.
- J. Clean completed construction as frequently as necessary throughout the construction period.

3.2 CLOSEOUT CLEANING

- A. Complete the following prior to requesting inspection for Substantial Completion:
1. Clean and remove from the Site rubbish, waste material, debris, and other foreign substances.
 2. Sweep paved areas broom-clean. Remove petrochemical spills, stains, and other foreign deposits.
 3. Hose-clean sidewalks and loading areas.
 4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 5. Leave surface waterways, drainage routes, storm sewers, and gutters open and clean.
 6. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to pre-construction condition.
 7. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign substances.
 8. Clean, wax, and polish wood, vinyl, and painted floors.
 9. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
 10. In unoccupied spaces, sweep concrete floors broom-clean.
 11. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 12. Remove non-permanent tags and labels.
 13. Surface Finishes:

- a. Touch-up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
 - b. Do not paint over “UL” or similar labels, including mechanical and electrical nameplates.
 - 14. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign substances.
 - 15. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
 - 16. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - 17. Clean lighting fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing lighting fixture components that are burned out or noticeably dimmed from use during construction. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - 18. Leave the Site clean, and in neat, orderly condition, satisfactory to OWNER and ENGINEER.
- B. Complete the following prior to requesting final inspection:
- 1. Following completion of the Work on the “punch list” of Work uncompleted at Substantial Completion, clean in accordance with Paragraph 3.2.A of this Section.

+ + END OF SECTION + +

SECTION 01 75 11

CHECKOUT AND STARTUP PROCEDURES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall initially start up and place equipment and systems installed under the Contract into successful operation, in accordance with the equipment manufacturer's written instructions and as instructed by Supplier at the Site.
2. Provide all material, labor, tools, and equipment required to complete equipment checkout and start-up.
3. Provide chemicals, lubricants, and other required operating fluids.
4. Provide fuel, electricity, water, filters, and other expendables required for start-up of equipment, unless otherwise specified.
5. General activities by CONTRACTOR include the following:
 - a. Cleaning, as required under other provisions of the Contract Documents.
 - b. Removing temporary protective coatings.
 - c. Flushing and replacing lubricants, where required by manufacturer.
 - d. Lubrication.
 - e. Checking shaft and coupling alignments and resetting where required.
 - f. Checking and setting motor, pump, and other equipment rotation, safety interlocks, and belt tensions.
 - g. Checking and correcting (as necessary) leveling plates, grout, bearing plates, anchorage devices, fasteners, and alignment of piping, conduits, and ducts that may place stress on the connected equipment.
 - h. Performing all adjustments required.

B. Coordination:

1. Coordinate checkout and start-up with other contractors, as necessary.
2. Do not start up system or subsystem for continuous operation until all components of that system or subsystem, including instrumentation and controls, have been tested to the extent practicable and proven to be operable as intended by the Contract Documents.
3. OWNER will furnish sufficient personnel to assist CONTRACTOR in starting up equipment, but responsibility for proper operation is CONTRACTOR's.
4. Supplier shall be present during checkout, startup, and initial operation, unless otherwise acceptable to ENGINEER.
5. Startup of heating equipment, air conditioning equipment, and other equipment that provides cooling or other temperature control, and systems is dependent upon the time of year. Return to the Site at beginning of next heating or cooling season (as applicable) to recheck and start the appropriate systems.

6. Do not start up system, unit process, or equipment without submitting acceptable preliminary operations and maintenance manuals by CONTRACTOR in accordance with Section 01 78 23, Operations and Maintenance Data.
- C. OWNER's Assumption of Responsibility for Equipment and Systems:
1. OWNER will assume responsibility for the equipment upon Substantial Completion, unless otherwise mutually agreed upon by OWNER and CONTRACTOR or as documented in the certificate of Substantial Completion.
 2. Before turning over to OWNER responsibility for operating and maintaining system or equipment CONTRACTOR shall:
 - a. Provide training of operations and maintenance personnel in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.
 - b. Complete performance of equipment and system field quality control testing in accordance with the Contract Documents, to the extent possible.
 - c. Submit acceptable final operations and maintenance manuals in accordance with Section 01 78 23, Operations and Maintenance Data.
 - d. Obtain from ENGINEER final certificate of Substantial Completion for either entire Work or the portion being turned over to OWNER.

1.2 SUBMITTALS

- A. Closeout Submittals: Submit the following:
1. Certifications:
 - a. Supplier's certification of installation in accordance with Paragraph 3.1.B of this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SERVICES OF SUPPLIER

- A. When specified, furnish services of competent, qualified representatives of material and equipment manufacturers, including supervising installation, adjusting, checkout, startup, and testing of materials and equipment.
- B. Certification:
1. When services by Supplier are required at the Site, within 14 days after first test operation of equipment, submit to ENGINEER a letter from Supplier, on Supplier's letterhead, stating that materials and equipment are installed in accordance with Supplier's requirements and installation instructions, and in accordance with the Contract Documents.
 2. In lieu of Supplier letter, submit completed form attached to this Section.

3. Include in the final operations and maintenance manual for the associated equipment a copy of the letter or completed form, as applicable.

3.2 MINIMUM STARTUP REQUIREMENTS

- A. Bearings and Shafting:
 1. Inspect for cleanliness, and clean and remove foreign matter.
 2. Verify alignment.
 3. Replace defective bearings and those that operate in a rough or noisy manner.
 4. Grease as necessary, in accordance with manufacturer's recommendations.
- B. Drives:
 1. Adjust tension in V-belt drives and adjust vari-pitch sheaves and drives for proper equipment speed.
 2. Adjust drives for alignment of sheaves and V-belts.
 3. Clean and remove foreign matter before starting operation.
- C. Motors:
 1. Check each motor for comparison to amperage nameplate value.
 2. Correct conditions that produce excessive current flow and conditions that exist due to equipment malfunction.
- D. Pumps:
 1. Check glands and seals for cleanliness and adjustment before running pump.
 2. Inspect shaft sleeves for scoring.
 3. Inspect mechanical faces, chambers, and seal rings, and replace if defective.
 4. Verify that piping system is free of dirt and scale before circulating liquid through pump.
- E. Valves:
 1. Inspect manual and automatic control valves, and clean bonnets and stems.
 2. Tighten packing glands to ensure no leakage, but allow valve stems to operate without galling.
 3. Replace packing in valves to retain maximum adjustment after system is determined to be complete.
 4. Replace packing on valves that continue to leak.
 5. Remove, correct, and replace bonnets that leak.
 6. After cleaning, coat packing gland threads and valve stems with surface preparation of "Molycote" or "Fel-Pro".
- F. Verify that control valve seats are free of foreign matter and are properly positioned for intended service.
- G. Pipe Joints and Other Connections:
 1. Tighten flanges and other pipe joints after system has been placed in operation.
 2. Replace gaskets that show signs of leakage after tightening.
 3. Inspect all joints for leakage.

4. Promptly remake each joint that appears to be faulty; do not wait for rust or other corrosion to form.
 5. Clean threads on both parts, and apply compound and remake joints.
- H. After system has been placed in operation, clean strainers, drives, pockets, orifices, valve seats, and headers in fluid system to ensure freedom from foreign matter.
 - I. Open steam traps and air vents, where used, and remove operating elements. Clean thoroughly, replace internal parts, and place back into operation.
 - J. Remove rust, scale, and foreign matter from equipment and renew defaced surfaces.
 - K. Set and calibrate draft gauges of air filters and other equipment.
 - L. Inspect fan wheels for clearance and balance. Provide factory-authorized personnel for adjustment where needed.
 - M. Check each electrical control circuit to verify that operation complies with the Contract Documents.
 - N. Inspect each pressure gauge, thermometer, and other instruments for calibration. Replace items that are defaced, broken, or that read incorrectly.
 - O. Repair damaged insulation.
 - P. Excess Gasses and Fluids:
 1. Vent gasses trapped in systems.
 2. Verify that liquids are drained from all parts of gas or air systems.

3.3 ATTACHMENTS

- A. The attachment listed below, following this Section's "End of Section" designation, is a part of this Specification Section.
 1. Supplier's Installation Certification Form (one page).

+ + END OF SECTION + +

SUPPLIER'S INSTALLATION CERTIFICATION

Contract No. and Name: _____

Equipment Specification Section: _____

Equipment Name: _____

Contractor: _____

Manufacturer of Equipment: _____

The undersigned Supplier of the equipment or system described above hereby certifies that Supplier has checked the installation of the equipment or system and that the equipment or system, as specified in the Contract Documents, has been provided in accordance with the manufacturer's recommendations and the Contract Documents, and that the trial operation of the equipment or system has been satisfactory.

Comments: _____

Date

Supplier Name (print)

Signature of Supplier

Date

Contractor Name (print)

Signature of Contractor

SECTION 01 77 19

CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.1 GENERAL

- A. Scope:
 - 1. Section Includes.
 - a. Substantial Completion.
 - b. Final inspection.
 - c. Request for final payment and acceptance of the Work.

1.2 SUBSTANTIAL COMPLETION

- A. Substantial Completion – General:
 - 1. Prior to requesting Substantial Completion, perform the following for the substantially completed Work:
 - a. Materials and equipment for which Substantial Completion is requested shall be fully ready for their intended use, including full operating and monitoring capability in automatic and manual modes.
 - b. Complete field quality control Work, including testing at the Site, indicated in Specifications Sections for individual materials and equipment items. Submit results of, and obtain Engineer's acceptance of, field quality control tests required by the Contract Documents.
 - b. Startup and checkout shall be completed in accordance with Section 01 75 11, Startup and Checkout Procedures, and requirements of the Specifications for the various materials and equipment in the substantially completed Work.
 - c. Cleaning for Substantial Completion shall be completed in accordance with Section 01 74 05, Cleaning.
 - d. Spare parts, extra stock materials, and tools shall be delivered and accepted in accordance with Section 01 78 43, Spare Parts and Extra Materials, and the Specifications for the various materials and equipment.
 - e. Training shall be completed in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.
 - f. Submit and obtain Engineer's acceptance of final operations and maintenance manuals.
 - g. Obtain and submit to Engineer all required permits, inspections, and approvals of authorities having jurisdiction for the substantially completed Work to be occupied and used by Owner.
 - h. Complete other tasks that the Contract require be completed prior to Substantial Completion.

2. Procedures for requesting and documenting Substantial Completion are in the General Conditions, as may be modified by the Supplementary Conditions.
3. Sample letter for Contractor to request inspection for Substantial Completion is attached to this Specifications Section as Exhibit A. Use the model language of the sample letter, modified to suit the Project.
4. Unless decided otherwise by Owner and Engineer, form of certificate of Substantial Completion will be EJCDC® C-625, "Certificate of Substantial Completion" (2018 edition), prepared by Engineer.
5. Refer to the Agreement and Section 01 29 76, Progress Payment Procedures, for requirements regarding consent of surety to partial release of or reduction in retainage.

1.3 FINAL INSPECTION

A. Final Inspection – General:

1. Prior to requesting final inspection, verify that all the Work is fully complete and ready for final payment. A Partial checklist for this purpose is attached to this Specifications Section as Exhibit B.
2. Sample letter for Contractor to request final inspection is attached to this Specifications Section as Exhibit C. Use the model language of the sample letter, modified to suit the Project.
3. Procedures for requesting and documenting the final inspection are in the General Conditions, as may be modified by the Supplementary Conditions, and as augmented in this Section.

1.4 REQUEST FOR FINAL PAYMENT AND ACCEPTANCE OF THE WORK

A. Procedure:

1. Submit request for final payment in accordance with the Agreement and General Conditions, as may be modified by the Supplementary Conditions, and using procedure specified in Section 01 29 76, Progress Payment Procedures, and this Section.
2. Acceptance of the Work:
 - a. Upon Engineer's receipt of the final Application for Payment, accompanied by other required Contract closeout documentation in accordance with the Contract Documents, Engineer will issue to Owner and Contractor a notice of acceptability of the Work, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - b. Nothing other than receipt of such notice of acceptability from Engineer constitutes acceptance of the Work.
 - c. Unless decided otherwise by Owner and Engineer, form of acceptance will be EJCDC® C-626, "Notice of Acceptability of Work", (2018 edition).

B. Request for final payment shall include:

1. Documents required for progress payments in Section 01 29 76, Progress Payment Procedures.
2. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.
3. List of all disputes that Contractor believes are unsettled, presented on Contractor's letterhead. If there are no such disputes or Claims, so indicate in writing.
4. Consent of Surety to Final Payment:
 - a. Acceptable form includes AIA® G707™, "Consent of Surety to Final Payment" (1994 or later edition), or other form acceptable to Owner.
5. Releases of Liens:
 - a. Submit "complete and legally effective releases (satisfactory to Owner) of all Liens filed in connection with the Work, regardless of whether such Lien was filed by Contractor or any Subcontractor or Supplier.
 - b. Each release of Lien shall be signed by an authorized representative of the entity submitting the release of Lien, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
6. Waivers of Lien Rights:
 - a. Submit legally-binding waivers of rights to file Liens (acceptable to Owner), from Contractor and each Subcontractor and Supplier that provided Contractor, Subcontractor, or Supplier with labor, material, or equipment totaling \$1,000 or more for the Work.
 - b. Furnish final list of Subcontractors and Suppliers, using the form included in Section 01 29 76, Progress Payment Procedures, indicating final amount of the associated subcontract or purchase order for each. Include on the list all lower-tier Subcontractors and Suppliers retained by higher-tier Subcontractors and Suppliers.
 - c. Each waiver of Lien rights shall be signed by an authorized representative of the entity submitting waiver of Lien rights, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
 - d. Waiver of Lien rights may be conditional upon receipt of final payment.
 - e. Required Affidavits: Submit the following:
 - 1) Affidavit of payment of debts and claims, submitted by Contractor. Acceptable form includes AIA® G706™, "Contractor's Affidavit of Payment of Debts and Claims" (1994 or later edition), or other form acceptable to Owner, and;
 - 2) Affidavit of release of Liens, submitted by Contractor. Acceptable form includes AIA® G706A™, "Affidavit of Release of Liens" (1994 or later edition).
 - f. Waivers of Lien rights and affidavits and supporting documents furnished under this Paragraph 1.4.B.6 shall comply with the requirements of the General Conditions, as may be modified by the Supplementary Conditions.

- g. Each affidavit furnished shall be signed by an authorized representative of the entity furnishing the affidavit, and shall include issuing entity's corporate seal, when applicable.
- h. Where all required waivers of Lien rights and affidavits are not submitted:
 - 1) Submit letter on Contractor's letterhead indicating the Subcontractor(s) and Suppliers for whom such waivers or releases were not obtained, amount owed to such entity, reason(s) why such amount was not previously paid and indicate how Contractor intends to fulfill its obligations and assure Owner that associated debts and claims are paid.
 - 2) In lieu of the releases or waivers of Liens specified in Paragraphs 1.4.B.5 and 1.4.B.6 of this section, and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied.
 - 3) If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- 7. Evidence satisfactory to Owner that all title issues (not otherwise addressed by releases of Liens, waivers of Lien rights, and related documentation required in Paragraphs 1.4.B.5 and 1.4.B.6 of this section) have been resolved and that title will pass to Owner free and clear of other title defects, or will so pass upon final payment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXHIBITS

A. The documents listed below, following this Section's "End of Section" designation, are part of this Specifications Section:

1. Exhibit A - Sample letter for Contractor's use in requesting inspection for Substantial Completion (two pages).
 2. Exhibit B - Sample partial checklist to identify readiness for final inspection (four pages).
 3. Exhibit C - Sample letter for Contractor's use in requesting final inspection (one page).
- B. In the model language of the attached sample letters for the Contractor to request inspection for Substantial Completion and the final inspection, italicized language in brackets, e.g., "[*insert date*]" indicates instructions to the drafter of the letter and often indicates specific information to be inserted by Contractor; do not include bracketed, italicized text in the final version of the letter(s) prepared for the Project. Non-italicized language in brackets is optional language; use the appropriate language to complete the actual letter for the Project and edit where required to suit the specific circumstances.

+ + END OF SECTION + +

**EXHIBIT A - SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING INSPECTION FOR SUBSTANTIAL COMPLETION**

[Date]

[Name of Engineer's contact person]

ARCADIS U.S., Inc.

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Inspection for Substantial Completion

Dear [addressee]:

In our opinion, [all of] [or] [a portion of] the Work under the above-referenced Contract is substantially complete as of [insert month, day, year on which Substantial Completion was achieved]. [The specific portion of the Work that we believe is substantially complete is [insert identification of that portion of the Work that is substantially complete].]

Enclosed is our listing of uncompleted Work items ("punch list"). In accordance with Paragraph 15.03.A of the General Conditions, we hereby request: 1) That the Engineer schedule and perform the inspection for Substantial Completion as soon as possible, and 2) Issuance of the certificate of Substantial Completion.

In accordance with Paragraph 15.03.D of the General Conditions, upon Substantial Completion, we propose the following relative to apportionment of responsibilities between the Owner and the Contractor:

1. Security, Protection, Insurance:

- a. Site Security: [insert proposal; address whether Owner or Contractor will be responsible for security of the Site].
- b. Protection of the Substantially Completed Work: [insert proposal; address whether Owner or Contractor will be responsible for protection].
- c. Property Insurance: [insert proposal; typically, Owner assumes responsibility for property insurance upon Substantial Completion]

2. Operation and Maintenance:

- a. Operation: [insert proposal; address whether Owner or Contractor will be responsible for operating the substantially completed Work].

- b. Maintenance: *[insert proposal; address whether Owner or Contractor will be responsible for maintaining the substantially completed Work]*.
- 3. Utilities: *[for each of the following, indicate whether Owner or Contractor will be responsible for utilities and services, or whether responsibility will be shared; if shared, indicate proposed cost-sharing]*
 - a. Electricity: *[insert proposal]*.
 - b. Natural Gas/Fuel/Heating: *[insert proposal]*.
 - c. Water Supply: *[insert proposal]*.
 - d. Wastewater: *[insert proposal]*.
 - e. Communications (Telephone, Internet, Video): *[insert proposal]*.

In accordance with Paragraph 15.08.A of the General Conditions, we understand that the Contract's correction period for the Work covered by the certificate of Substantial Completion commences on the Substantial Completion date documented in said certificate. *[Drafter: Also see Paragraph 15.08.C of the General Conditions and, where necessary, edit this paragraph of the letter accordingly.]*

Should you have questions or comments regarding this notice, please contact [the undersigned] *[or] [insert other contact person's name]*, at *[insert telephone number and e-mail address]*.

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

Preliminary list of uncompleted Work items ("punch list"; [##] pages)

Copies:

[Owner's project manager]

EXHIBIT B - SAMPLE PARTIAL CHECKLIST TO IDENTIFY READINESS FOR FINAL INSPECTION

Project: _____

Contract: _____

Contractor: _____

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
1. All Shop Drawings, Samples, and Submittals approved by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
2. Final services completed by Suppliers, including submittal of "Supplier Installation Certification" in Section 01 75 11, Checkout and Startup Procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
3. Final Work completed by Subcontractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
4. Permits closed out and regulatory compliance transitioned from construction to operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
5. All outstanding change issues are addressed and all Change Proposals submitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
6. All Claims are resolved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
7. All defective Work of which Contractor is aware has been corrected in accordance with the Contract Documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
8. Issues related to Constituents of Concern and potential Hazardous Environmental Condition have been fully addressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
9. All spare parts, tools, and extra stock materials have been furnished in accordance with the Contract Documents, and documentation thereof submitted to Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
10. All final Operations & Maintenance manuals have been	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
submitted and accepted by Engineer						
Remarks:						
11. Manufacturer warranties and software license(s) furnished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
12. Instruction and training of operations and maintenance personnel is complete and records of training submitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
13. MBE/WBE/DBE compliance report(s) submitted (when applicable)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
14. All field engineering submittals, including survey data, furnished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
15. All Work on "punch list" is complete in accordance with the Contract Documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
16. All record documents submitted to and accepted by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
17. Contractor is fully demobilized from Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
18. All Site restoration is complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
19. Final cleaning of all work areas is complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
20. Lien waivers or affidavits of payment obtained from Subcontractors and Suppliers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
21. Evidence of Contractor liability insurance furnished for correction period	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						
22. All other required Contract closeout documents obtained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Remarks:						

**EXHIBIT C - SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING FINAL INSPECTION**

**SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT
REQUESTED**

[Date]

[Name of Engineer's contact person]

ARCADIS U.S., Inc.

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Final Inspection

Dear [addressee]:

In our opinion, all of the Work under the above-referenced Contract is complete and ready for final payment as of [insert month, day, year on which final completion was achieved]. In accordance with Paragraph 15.05.A of the General Conditions, we hereby request that the Engineer schedule and perform the final inspection as soon as possible. Upon successful completion of the final inspection, we will submit our final Application for Payment accompanied by the required Contract closeout documentation in accordance with the Contract Documents.

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] [insert other contact person's name], at [insert telephone number and e-mail address].

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

None

Copies:

[Owner's project manager]

SECTION 01 77 23

POST-FINAL INSPECTION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. This Section includes requirements for the post-final inspection, and is coordinated with the payment provisions of the Agreement and Supplementary Conditions.
 - 2. Shortly before the end of the correction period required under the Contract Documents, ENGINEER will schedule with OWNER and CONTRACTOR the post-final inspection and will advise OWNER and CONTRACTOR in writing of the date and time for post-final inspection.
- B. CONTRACTOR's project manager shall attend the post-final inspection.
- C. After post-final inspection, ENGINEER will furnish to CONTRACTOR a list of required correction Work that shall be completed by CONTRACTOR in accordance with the Contract Documents. Such successful completion of corrective Work is required before ENGINEER will recommend payment of final retainage by OWNER.
- D. Submit "final" Application for Payment in accordance with the final Application for Payment procedures of the General Conditions, as may be modified by the Supplementary Conditions, and the Specifications, including furnishing all required Contract closeout documentation and completion of all Work except for the post-final inspection and associated correction Work (if any). OWNER will release remaining retainage withheld for post-final inspection following post-final inspection and completion of correction Work (if any), in accordance with progress payment procedures of the Contract, except that consent of surety to final payment shall accompany the last (post-final inspection) Application for Payment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 78 23

OPERATIONS AND MAINTENANCE DATA

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for manufacturers' operations and maintenance manuals and related data to be furnished by CONTRACTOR.
2. CONTRACTOR shall submit operation and maintenance data, in accordance with this Section and in accordance with requirements elsewhere in the Contract Documents, as instructional and reference manuals by operations and maintenance personnel at the Site.
3. Required operation and maintenance data groupings are listed in table(s) in Article 1.2 of this Section. At minimum, submit operation and maintenance data for:
 - a. All equipment and systems.
 - b. Valves, gates, actuators, and related accessories.
 - c. Instrumentation and control devices.
 - d. Electrical equipment.
4. For each operation and maintenance manual, submit the following:
 - a. Preliminary Submittal: Printed and bound copy of entire operation and maintenance manual, except for test data, service reports by Supplier, and submit electronic copies.
 - b. Final Submittal: Printed and bound copy of complete operations and maintenance manual, including test data and service reports by Supplier, and submit electronic copies.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data:
 - a. Submit the operations and maintenance data indicated in the Contract Documents, grouped into submittals as indicated in Table 01 78 23-A:

TABLE 01 78 23-A, REQUIRED OPERATIONS AND MAINTENANCE DATA

Name of O&M Manual/Data	For Materials or Equipment Specified in Section(s)
Detailed maintenance manual	08 36 16, Sectional Doors
Detailed maintenance manuals	08 71 00, Door Hardware
Detailed maintenance manuals	21 13 13, Wet-Pipe Sprinkler Systems
Detailed maintenance manuals	21 13 16, Dry-Pipe Sprinkler Systems
Detailed maintenance manuals	23 82 39.63, Gas-fired Unit Heaters
Detailed maintenance manuals	33 44 36, Oil and Stormwater

Name of O&M Manual/Data	For Materials or Equipment Specified in Section(s)
	Separators

B. Quantity Required and Timing of Submittals:

1. Preliminary Submittal:
 - a. Printed Copies: three copies, exclusive of copies required by CONTRACTOR.
 - b. Electronic Copies: In accordance with Section 01 31 26, Electronic Communication Protocols.
 - c. Submit to ENGINEER by the earlier of: 90 days following approval of Shop Drawings and product data submittals, or 10 days prior to starting training of operations and maintenance personnel, or 10 days prior to field quality control testing at the Site.
 - d. Furnish preliminary operation and maintenance data submittal in acceptable form and content, as determined by ENGINEER, before associated materials and equipment will be eligible for payment.
2. Final Submittal: Furnish final submittal prior to Substantial Completion, unless submittal is specified as required prior to an interim Milestone.
 - a. Printed Copies: three copies.
 - b. Electronic Copies: In accordance with Section 01 31 26, Electronic Communication Protocols.

1.3 FORMAT OF PRINTED COPIES

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy as required. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be identical.
2. Binders shall be locking three-ring/"D"-ring type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front of each volume.
3. Do not overfill binders.
4. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
5. Provide the following information on cover of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, if more than one volume is required, listed as "Volume ___ of ___", with appropriate volume-designating numbers filled in.
 - d. Name of Project and, if applicable, Contract name and number.
 - e. Name of building or structure, as applicable.
6. Provide the following information on spine of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, if more than one volume is required, listed as "Volume

- ___ of ___”, with appropriate volume-designating numbers filled in.
- d. Project name and building or structure name.

B. Pages:

1. Print pages in operations and maintenance manual on 30-pound (minimum) paper, 8.5 inches by 11 inches in size.
2. Reinforce binding holes in each individual sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of the manual, reinforcing of pages within booklet or pamphlet is not required.
3. Furnish each page with binding margin not less than one inch wide. Punch each page with holes suitable for the associated binding.

C. Drawings:

1. Bind into the operation and maintenance manual drawings, diagrams, and illustrations up to and including 11 inches by 17 inches in size, with reinforcing specified for pages.
2. Documents larger than 11 inches by 17 inches shall be folded and inserted into clear plastic pockets bound into the manual. Mark pockets with printed text indicating content and drawing numbers. Include not more than three drawing sheets per pocket.

D. Copy Quality and Document Clarity:

1. Contents shall be original-quality copies. Documents in the operations and maintenance manual shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals that contain copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable. Faxed copies are unacceptable.
2. Clearly mark in ink to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished or cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:

1. Table of Contents:
 - a. Provide table of contents in each volume of each operations and maintenance manual.
 - b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identification is unacceptable.
2. Use dividers and indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major

subdivisions of data in each manual.

1.4 FORMAT OF ELECTRONIC COPIES

- A. Electronic Copies of Operation and Maintenance Manuals:
 - 1. Each electronic copy shall include all information included in the corresponding printed copy.
 - 2. Submit electronic copies in accordance with Section 01 31 26, Electronic Communications Protocols.
 - 3. File Format:
 - a. Files shall be in “portable document format” (PDF). Files shall be electronically searchable.
 - b. Submit separate file for each separate document in the printed copy.
 - c. Within each file, provide bookmarks for the following:
 - 1) Each chapter and subsection listed in the corresponding printed copy document’s table of contents.
 - 2) Each figure.
 - 3) Each table.
 - 4) Each appendix.
 - 4. Also submit drawings and figures in one of the following formats: “.bmp”, “.tif”, “.jpg”, or “.gif”. When files are submitted on CD, submit such files in a separate directory on the CD. When such files are submitted via other means, appropriately transmit them to avoid confusion with other files transmitted.
- B. Copies of Programming and Configuration Files:
 - 1. Furnish on CD or portable USB “thumb drive” copy of all software programming, such as programmable logic controller programs, prepared specifically for the Project. Third-party, licensed, commercially available software is excluded from requirements of this Article; submit copies of commercially-available, licensed, third-party software, where required, in accordance with the Contract Documents.
 - 2. Submit on CD or portable USB “thumb drive” copies of system configuration prepared specifically for the Project, such as plant monitoring system and SCADA display configurations.
 - 3. Submit programming and configuration files concurrently with electronic copies of operation and maintenance data.

1.5 CONTENT

- A. General:
 - 1. Prepare each operations and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-built drawings as applicable, bills of materials, technical bulletins, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the

Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.

2. Completeness and Accuracy:
 - a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
 - b. Operations and maintenance manuals shall be complete and accurate.
 - c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.
 3. Submit complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; operating instructions for start-up, normal and emergency conditions; regulation and control; operational troubleshooting; and shutdown. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
- B. Submit written explanations of safety considerations relating to operation and maintenance procedures.
- C. Submit complete, detailed, written preventive maintenance instructions including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
1. Written explanations with illustrations for each preventive maintenance task such as inspection, adjustment, lubrication, calibration, and cleaning. Include pre-startup checklists for each equipment item and maintenance requirements for long-term shutdowns.
 2. Recommended schedule for each preventive maintenance task.
 3. Lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
 4. Table of alternative lubricants.
 5. Troubleshooting instructions.
 6. List of required maintenance tools and equipment.
- D. Submit complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
1. Manufacturer's name, address, telephone number, fax number, and Internet website address.
 2. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail addresses, when applicable.
 3. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.

4. For each part or piece include the following information:
 - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - b. Part name or description.
 - c. Manufacturer's part number.
 - d. Quantity of each part used in each assembly.
 - e. Current unit price of the part at the time the operations and maintenance manual is submitted. Price list shall be dated.
- E. Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
- F. Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
- G. Submit manufacturer's installation and operation bulletins, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where materials pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
- H. Submit original-quality copies of each approved and accepted Shop Drawing, product data, and other submittal, updated to indicate as-installed condition. Reduced drawings are acceptable only if reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- I. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
- J. Submit copy of warranty bond and service contract as applicable.
- K. When copyrighted material is used in operations and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 78 36

WARRANTIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This section describes general requirements for warranties required in the various Specifications.
2. Provisions on the Contract's correction period, CONTRACTOR'S general warranty and guarantee, and CONTRACTOR's warranty of title are in the General Conditions, as may be modified by the Supplementary Conditions.
3. This section includes general requirements for:
 - a. Suppliers' standard warranties.
 - b. Suppliers' special warranties.
 - c. Implied warranties.
 - d. Commencement and duration of warranties.

1.2 SUBMITTALS

A. General:

1. For each item of equipment furnished under the Contract, submit Supplier's standard warranty, regardless of whether such warranty or submittal thereof is required by the associated Specifications for that item. Submit such warranties for materials where such submittal is required in the Specifications for the material.
2. For each item of material or equipment where Supplier's special (or extended) warranty is required by the Contract Documents, submit appropriate special warranty that complies with the Contract Documents.
3. Supplier's warranties shall be specifically endorsed solely to OWNER by the entity issuing such warranty.
4. Submit Suppliers' standard warranties and special warranties as submittals in accordance with Schedule of Submittals accepted by ENGINEER.

1.3 SUPPLIERS' WARRANTIES FOR MATERIALS AND EQUIPMENT

A. Warranty Types:

1. Required by the General Conditions:
 - a. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, CONTRACTOR's general warranty and guarantee and requirements for the Contract's correction period.
 - b. Disclaimers and limitations in specific materials and equipment warranties do not limit CONTRACTOR's general warranty and

guarantee, nor does such affect or limit CONTRACTOR's performance obligations under the correction period.

2. Material or equipment manufacturer's standard warranty is pre-printed, written warranty published by item's manufacturer and specifically endorsed by manufacturer to OWNER.
3. Special warranty is written warranty that either extends the duration of material or equipment manufacturer's standard warranty or provides other, increased rights to OWNER. Where the Contract Documents indicate specific requirements for warranties that differ from the manufacturer's standard warranty for that item, special warranty is implied.

B. Requirements for Special Warranties:

1. Submit written special warranty document that contains appropriate provisions and identification, ready for execution by material or equipment manufacturer and OWNER. Submit draft warranty with submittals required prior to fabrication and shipment of the item from the Supplier's facility.
2. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed by product manufacturer and other entities as appropriate.
3. Specified Form: When specified forms for special warranties are included in the Contract Documents, prepare written document, properly executed by item manufacturer and OWNER, using the required form.
4. Refer to the Specifications for content and requirements for submitting special warranties.

1.4 IMPLIED WARRANTIES

A. Warranty of Title and Intellectual Property Rights:

1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.
2. Provisions on intellectual property rights, including patent fees and royalties, are in the General Conditions, as may be modified by the Supplementary Conditions.

B. Warranty of Merchantability:

1. Notwithstanding any other provision of the Contract to the contrary, implied warranties of merchantability required by Laws and Regulations apply to the materials and equipment incorporated into the Work.

C. Warranty of Fitness-for-Purpose:

1. Implied warranty of fitness-for-purpose for materials and equipment to be incorporated into the Work is hereby disclaimed by OWNER and CONTRACTOR.
2. When Supplier is aware of, or has reason to be aware of, specified materials or features of the Work that are contrary to the intended use, purpose, service, application, or environment in which the material or equipment item will be

used, submit request for interpretation in accordance with Section 01 26 00, Contract Modification Procedures. Where appropriate, such request for interpretation shall indicate the apparent discrepancy and propose appropriate, alternative materials or equipment.

1.5 COMMENCEMENT AND DURATION OF WARRANTIES

A. Commencement of Warranties:

1. Contract correction period and CONTRACTOR's general warranty commence as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Suppliers' general warranties and special warranties commence running on the date that the associated item is certified by ENGINEER as substantially complete. In no event shall special warranties commence running prior to ENGINEER's review and acceptance of special warranty submittal for the item.
3. Implied warranties commence in accordance with Laws and Regulations.

B. Duration of Warranties:

1. Duration of correction period is in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
2. Duration of CONTRACTOR's general warranty and guarantee is in accordance with Laws and Regulations.
3. Duration of Suppliers' general warranties is in accordance with the applicable general warranty document accepted by ENGINEER.
4. Duration of required Suppliers' special warranties shall be in accordance with the requirements of the Contract Documents for the subject item.
5. Duration of implied warranties shall be in accordance with Laws and Regulations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes requirements for Project record documents, to supplement the requirements of the General Conditions, as may be modified by the Supplementary Conditions.
2. Contractor shall provide all labor, materials, equipment, and services to maintain and submit to Engineer Project record documents in accordance with the Contract Documents.

B. Maintenance of Record Documents:

1. Maintain in Contractor's field office, in clean, dry, legible condition, complete sets of the following record documents: Drawings, Specifications, and Addenda; Shop Drawings, Samples, and other Contractor submittals, including records of test results, approved or accepted as applicable, by Engineer; Change Proposals, Proposal Requests, Change Orders, Work Change Directives, Field Orders, copies of all interpretations and clarifications issued, photographic documentation, survey data, and all other documents pertinent to the Work.
2. Provide files and racks for proper storage and easy access to record documents. File record documents in accordance with the latest edition of the Construction Specification Institute's *MasterFormat*TM used for organizing the Project Manual, unless otherwise accepted by Engineer.
3. Promptly make record documents available for observation and review upon request of Engineer or Owner. Requirements for review of record documents status as a condition precedent to progress payments is in Section 01 29 73, Schedule of Values, and Section 01 29 76, Progress Payment Procedures.
4. Do not use record documents for any purpose other than serving as Project record. Do not remove record documents from Contractor's field office without Engineer's approval.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:

1. Record Documents:
 - a. Submit the following Project record documents:
 - 1) Drawings.
 - 2) Project manual including Specifications and Addenda (bound).
 - b. Prior to readiness for final payment, submit to Engineer one copy of Project's final record documents and obtain Engineer's acceptance of

- same. Submit complete record documents; do not make partial submittals.
- c. Submit both printed record documents and electronic record documents, in accordance with Section 01 31 26, Electronic Document Protocol.
 - d. Submit record documents with transmittal letter on Contractor letterhead in accordance with requirements in Section 01 33 00, Submittal Procedures.
2. Certifications:
- a. Record documents submittal shall include certification, with original signature of official authorized to execute legal agreements on behalf of Contractor, reading as follows:
 “*[Insert Contractor’s corporate name]* has maintained and submitted Project record documentation in accordance with the General Conditions and Supplementary Conditions, Section 01 78 39, Project Record Documents, and other elements of Contract Documents, for the Town of Clarkstown, New York, Highway Garage Expansion Project. We certify that each record document submitted is complete, accurate, and legible relative to the Work performed under our Contract, and that the record documents comply with the requirements of the Contract Documents.

[Provide signature, print name, print signing party’s corporate title, and date]”

1.3 RECORDING CHANGES

- A. Recording Changes – General:
- 1. At the start of the Project, label each record document to be submitted as, “PROJECT RECORD” using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.
 - 2. Keep record documents current consistent with the progress of the Work. Make entries on record documents within two working days of receipt of information required to record the change.
 - 3. Do not permanently conceal the Work until required information has been recorded for Project record documents.
 - 4. Accuracy of record documents shall be such that future searches for items shown on the record documents may rely reasonably on information obtained from Engineer-accepted record documents.
 - 5. Marking of Entries:
 - a. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to record documents.
 - b. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of record documents into legible electronic files in portable document format (“.PDF”).
 - c. Date each entry on record documents.
 - d. Indicate changes by drawing a “cloud” around the change(s) indicated.

- e. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.

B. Drawings:

1. Record changes on copy of the Drawings. Submittal of Contractor-originated or -produced drawings as a substitute for recording changes on a copy of the Drawings is unacceptable.
2. Record changes on plans, sections, elevations, schematics, schedules, and details as required for clarity, making reference dimensions and elevations (to Project datum) for complete record documentation.
3. Record actual construction including:
 - a. Depths of various elements of foundation relative to Project datum.
 - b. Horizontal and vertical location of Underground Facilities referenced to permanent surface improvements and project elevation datum. For each Underground Facility, including pipe fittings, show and indicate dimensions to not less than two permanent, visible surface improvements.
 - c. Location of exposed utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure and, where applicable, to Project elevation datum.
 - d. Changes in structural and architectural elements of the Work, including changes in reinforcing.
 - e. Field changes of dimensions, arrangements, and details.
 - f. Changes made in accordance with Addenda, Change Orders, Work Change Directives, and Field Orders.
 - g. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document such changes.
4. Recording Changes for Schematic Layouts:
 - a. Where arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout the final physical arrangement shall be determined by Contractor subject to acceptance by Engineer.
 - b. Record on the Project record documents all revisions to schematics on the Drawings, including: piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Drawings. Show and indicate actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.
 - c. When dimensioned plans and dimensioned sections or elevations on the Drawings show the Work schematically, indicate on the record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items
 - 1) Clearly identify each item of the Work by accurate notations such as “cast iron drain”, “rigid electrical conduit”, “copper waterline”, and similar descriptions.

- 2) Show by symbol or by note the vertical location of each item of the Work; for example, “embedded in slab”, “under slab”, “in ceiling plenum”, “exposed”, and similar designations. For piping not embedded, also indicate elevation dimension relative to Project elevation datum.
 - 3) Descriptions shall be sufficiently detailed to be related to the Specifications.
 - d. Engineer may furnish written waiver of requirements relative to schematic layouts shown on plans, sections, and elevations when, in Engineer’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on such waiver(s) being issued.
5. Supplemental Drawings:
 - a. In some cases, drawings produced during construction by Engineer or Contractor supplement the Drawings; these shall be included with Project record documents submitted by Contractor. Supplemental record drawings shall include drawings or sketches that are part of Change Orders, Work Change Directives, and Field Orders and that cannot be incorporated into the Drawings because of space limitations.
 - b. Supplemental drawings submitted with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.
 - c. When supplemental drawings developed by Contractor using computer-aided drafting/design (CADD) software are to be included in record drawings, submit electronic files for such drawings in accordance with Section 01 31 26, Electronic Document Protocol, as part of record drawing submittal. Label such files, “Supplemental Record Drawings”, including with Contractor’s name, Project name, and Contract designation.
 - c. When supplemental drawings developed by Contractor using computer-aided drafting/design (CADD) software are to be included in record drawings, submit electronic files for such drawings in (--1--) as part of record drawing submittal. Submit electronic files on compact disc labeled, “Supplemental Record Drawings”, including Contractor’s name, Project name, and Contract designation.

C. Specifications and Addenda:

1. Mark each Specifications Section to record:
 - a. Manufacturer, trade name, catalog number, and Supplier of each material and equipment item actually provided.
 - b. Changes made by Addendum, Change Orders, Work Change Directives, and Field Orders.

1.4 ELECTRONIC FILES FURNISHED BY ENGINEER

- A. CADD files of the Drawings will be furnished by Engineer upon the following conditions:
1. Contractor shall submit to Engineer a letter on Contractor letterhead requesting CADD files of the Drawings and indicating specific definition(s) or description(s) of how such files will be used, and specific description of benefits to Owner (including credit proposal, if applicable) if the request is granted.
 2. Contractor shall execute Engineer's standard agreement for release of electronic files and shall abide by the provisions of such agreement for release of electronic files. A copy is attached as Exhibit A.
 3. Layering system incorporated in CADD files shall be maintained as transmitted by Engineer. CADD files transmitted by Engineer containing cross-referenced files shall not be bound by Contractor. Drawing cross-references and paths shall be maintained. If Contractor alters layers or cross-reference files, Contractor shall restore all layers and cross-references prior to submitting record documents to Engineer.
 4. Contractor shall submit record drawings to Engineer in same CADD format that files were furnished to Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXHIBITS

- A. Engineer's Electronic File Release Agreement is attached as Exhibit A following this Section's "End of Section" designation, and is part of this Specifications Section:

+ + END OF SECTION + +

EXHIBIT A - ENGINEER'S ELECTRONIC FILE RELEASE AGREEMENT

[AUS Electronic File Release Agreement](#)

SECTION 01 78 43

SPARE PARTS AND EXTRA MATERIALS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes administrative and procedural requirements for furnishing spare parts, extra materials, maintenance supplies, and special tools required for maintenance (collectively, “spare parts and extra materials”) required by the Contract Documents.
2. Furnish spare parts, extra materials, and associated information, for materials and equipment furnished in accordance with the Contract Documents. Furnish such items in accordance with the requirements of this Section and the Specifications sections in which such items are indicated.
3. Contractor shall be fully responsible for loss and damage to spare parts and extra materials until such items are received by Owner’s facility manager.
4. Promptly replace spare parts and extra materials furnished by Owner to Contractor for use in remedying defective Work.

B. List of Spare Parts and Extra Materials:

1. With the Shop Drawings and product data submittals for each Specifications section, submit a complete listing of spare parts and extra materials required for maintenance for two years of operation, together with unit prices in current United States funds, and source(s) of supply for each.
2. Also include listing of spare parts and extra materials, with pricing and sources, in the operations and maintenance data submitted in accordance with Section 01 78 23, Operations and Maintenance Data.

1.2 SUBMITTALS

A. Submit the following:

1. Transfer Documentation: For each delivery of spare parts and extra materials, submit to Engineer the following:
 - a. Submit, on Contractor’s letterhead, a letter of transmittal for spare parts and extra materials furnished under each Specifications section. Letter of transmittal shall accompany spare parts and extra materials. Do not furnish letter of transmittal separate from associated spare parts and extra materials.
 - b. Furnish three original, identical, signed letters of transmittal for each delivery of spare parts and extra materials furnished under each Specifications section. Upon delivery of specified quantities and types of spare parts and extra materials to Owner, designated person from Owner will countersign each original letter of transmittal indicating

Owner's receipt of spare parts and extra materials in the quantity, type, and quality required by the Contract Documents. Owner will retain one fully-signed original, Contractor shall submit one fully-signed original to Engineer. Contractor shall retain one fully-signed original for Contractor's records.

- c. Letter of transmittal shall include the following:
 - 1) Information required for letters of transmittal in Section 01 33 00, Submittal Procedures.
 - 2) Transmittal shall list spare parts and extra materials furnished under each Specifications Section. List each individual part, material, equipment item, tool, and product and the associated quantity furnished.
 - 3) Include space for countersignature by Owner as follows: space for signature, space for printed name, and date.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Packaging and Labeling of Spare Parts and Extra Materials:
 - 1. Furnish spare parts and extra materials in manufacturer's unopened cartons, boxes, crates, or other original, protective covering suitable for preventing corrosion and deterioration for maximum length of storage normally anticipated by manufacturer.
 - 2. Packaging of spare parts and extra materials shall be clearly marked and identified with name of manufacturer, applicable material or equipment, part number, part description, and part location in the equipment or system.
 - 3. Protect and package spare parts and extra materials for maximum shelf life normally anticipated by manufacturer.
- B. Storage Prior to Delivery to Owner:
 - 1. Prior to furnishing spare parts and extra materials to Owner, store spare parts and extra materials in accordance with the Contract Documents and manufacturers' recommendations.
- C. Procedure for Delivery to Owner:
 - 1. Deliver spare parts and extra materials to Owner's permanent storage rooms at the Site or area(s) at the Site designated by Owner.
 - 2. When spare parts and extra materials are delivered, Contractor and Owner will mutually inventory the spare parts and extra materials delivered to verify compliance with the Contract Documents regarding quantity, part numbers, and quality.
 - 3. Additional procedures for delivering spare parts and extra materials to Owner, if required, will be developed by Engineer and complied with by Contractor.
 - 4. Contractor shall reimburse Owner for all costs and expenses incurred by Owner, including professional services, for delivery of inadequate, incorrect, or defective spare parts and extra materials. Owner may withhold such amounts from payments due Contractor via set-offs in accordance with the Contract Documents.

D. Delivery Time and Eligibility for Payment:

1. Deliver to Owner spare parts and extra materials prior to date of Substantial Completion for materials and equipment associated therewith.
2. Do not deliver spare parts and extra materials before commencing startup for associated material or equipment.
2. Spare parts and extra materials are not eligible for payment until delivered to Owner and Contractor's receipt of Owner's countersignature on letter of transmittal.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 79 23

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall furnish services of Supplier's operation and maintenance training specialists to instruct OWNER's and facility manager's personnel in recommended operating and maintenance procedures for materials and equipment furnished, in accordance with the Contract Documents.
2. Supplier shall provide a combination of classroom and field training at the Site, unless otherwise required elsewhere in the Contract Documents.
3. OWNER or facility manager reserves the right to record training sessions on video for OWNER's later use in instructing OWNER's or facility manager's personnel.

B. Scheduling of Training Sessions:

1. General:

- a. CONTRACTOR shall coordinate training services with start-up and initial operation of materials and equipment on days and times, and in manner, acceptable to OWNER, in accordance with the Contract Documents.
- b. Training may be required outside of normal business hours to accommodate schedules of operations and maintenance personnel. Furnish training services at the required days and times at no additional cost to OWNER.

2. Prerequisites to Training:

- a. Training of facility operations and maintenance personnel shall commence after preliminary operation and maintenance data has been submitted and accepted by ENGINEER, and Work required in Section 01 75 11, Checkout and Startup Procedures.
- b. At option of OWNER or ENGINEER, training may be allowed to take place before, during, or after equipment startup.

3. Training Schedule Submittal:

- a. Training Schedule Required: CONTRACTOR shall prepare and submit proposed training schedule for review and acceptance by ENGINEER and OWNER. Proposed training schedule shall show and indicate all training required in the Contract Documents, and shall demonstrate compliance with specified training requirements relative to number of hours of training for various elements of the Work, number of training sessions, and scheduling.
- b. Training Schedule Coordination: When Project has multiple prime contracts, prime contractors shall comply with this Section. All prime

- contractors shall coordinate with the General CONTRACTOR in developing a single training schedule submittal for the entire Project, to be submitted by General CONTRACTOR. All prime contractors shall implement training in accordance with the approved training schedule.
- c. Timing of Training Schedule Submittal: Submit initial training schedule not less than 60 days before scheduled start of first training session. Submit final training schedule, incorporating revisions in accordance with ENGINEER's comments, not later than 30 days prior to starting the first training session.
 - d. OWNER reserved the right to modify personnel availability for training in accordance with process or emergency needs at the facility.

1.2 QUALITY ASSURANCE

A. Qualifications:

- 1. Manufacturer's Instructors:
 - a. Shall be factory-trained by manufacturer of material or equipment.
 - b. Manufacturer's instructors shall be proficient and experienced in performing training of the type required.
 - c. Instructors shall be proficient in spoken and written English language.
 - d. Qualifications of instructors are subject to acceptance by ENGINEER. If ENGINEER does not accept qualifications of proposed instructor, furnish services of replacement instructor with acceptable qualifications.

B. Training Scheduling Conference:

- 1. Prior to preparing initial training schedule submittal, schedule and hold training scheduling conference at the location where progress meetings are held, to review:
 - a. Training requirements indicated in the Contract Documents.
 - b. Work to be completed prior to starting training.
 - c. Work progress and Progress Schedule relative to startup and training.
 - d. Scheduling constraints for OWNER's personnel, relative to days and times of training sessions.
 - e. Preferred days for training.
 - f. Location where training will be performed and facilities available.
 - g. Required submittals relative to training.
 - h. Other issues relative to training of operations and maintenance personnel.
- 2. Attendance is mandatory for the following:
 - a. CONTRACTOR's project manager.
 - b. CONTRACTOR's Site superintendent.
 - c. Project manager of Subcontractors responsible for furnishing materials and equipment for which training of operations and maintenance personnel is required.
 - d. Manufacturers and other Suppliers invited by CONTRACTOR.
 - f. ENGINEER.
 - g. Facility manager's staff responsible for training coordination, and staff responsible for scheduling operations and maintenance personnel.

3. If additional information must be developed to adequately cover agenda items, reconvene conference as soon as possible.
4. CONTRACTOR shall prepare minutes summarizing the discussions of conference, decisions made, and agreements and disagreements, and submit the minutes to each conference attendee.

1.3 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Training Schedule: Detailed schedule of training sessions, demonstrating compliance with number of training sessions, hours required in the Contract Documents, and complying with the Contract Times. Submit training schedule submittals in accordance with time frames specified in this Section.
- B. Informational Submittals: Submit the following:
 1. Lesson Plan: Acceptable lesson plan for training on each material or equipment item, in accordance with Table 01 79 23-A and the Contract Documents. Lesson plan shall comply with requirements of this Section as may be supplemented by Specifications Sections where materials and equipment are specified. Include with lesson plan copy of handouts that will be used during training sessions. Furnish lesson plan submittals in accordance with time frames specified in this Section.
 2. Qualifications:
 - a. Credentials of manufacturer's proposed operations and maintenance instructor(s). Credentials shall demonstrate compliance with requirements of this Section and shall include brief resume' and specific details of instructor's operating, maintenance, and training experience relative to the specific material and equipment for which instructor will provide training.
 3. Minutes of training scheduling conference.
- C. Closeout Submittals: Submit the following:
 1. Trainee sign-in sheets for each training session. Submit to OWNER's training coordinator with copy to ENGINEER.

1.4 LESSON PLAN

- A. Supplier's lesson plan shall describe specific instruction topics, system components for which training will be furnished, and training procedures. Handouts, if any, to be used in training shall be included with the lesson plan. Describe in lesson plan "hands-on" demonstrations planned for training sessions.
- B. Submit acceptable lesson plan not less than 14 days prior to starting associated training.
- C. Indicate in lesson plan estimated duration of each training segment.

- D. Lesson plan shall include the following:
1. Material and Equipment Overview (required for all types of operations and maintenance training):
 - a. Describe material and equipment's operating (process) function and performance objectives.
 - b. Describe material and equipment's fundamental operating principles and dynamics.
 - c. Identify equipment's mechanical, electrical, and electronic components and features. Group related components into subsystems and describe function of subsystem and subsystem's interaction with other subsystems.
 - d. Identify all support materials and equipment associated with operation of subject equipment, such as air intake filters, valve actuators, motors, and other appurtenant items and equipment.
 - e. Identify and describe safety precautions and potential hazards related to operation.
 - f. Identify and describe in detail safety and control interlocks.
 2. Operations Personnel Training:
 - a. Material and Equipment Overview: As described in Paragraph 1.4.D.1 of this Section.
 - b. Operation:
 - 1) Describe operating principles and practices.
 - 2) Describe routine operating, startup, and shutdown procedures.
 - 3) Describe abnormal or emergency startup, operating, and shutdown procedures that may apply.
 - 4) Describe alarm conditions and responses to alarms.
 - 5) Describe routine monitoring and recordkeeping procedures.
 - 6) Describe recommended housekeeping procedures.
 - c. Troubleshooting:
 - 1) Describe how to determine if corrective maintenance or an operating parameter adjustment is required.
 3. Mechanical Maintenance Training:
 - a. Material and Equipment Overview: As described in Paragraph 1.4.D.1 of this Section.
 - b. Material and Equipment Preventive Maintenance:
 - 1) Describe preventative maintenance inspection procedures required to:
 - a) Inspect materials and equipment in operation.
 - b) Identify potential trouble symptoms and anticipate breakdowns.
 - c) Forecast maintenance requirements (predictive maintenance).
 - 2) Define recommended preventative maintenance intervals for each component.
 - 3) Describe lubricant and replacement part recommendations and limitations.
 - 4) Describe appropriate cleaning practices and recommend intervals.
 - 5) Identify and describe use of special tools required for maintenance of materials and equipment.
 - 6) Describe component removal, installation, and disassembly and assembly procedures.

- 7) Perform “hands-on” demonstrations of preventive maintenance procedures.
- 8) Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
- 9) Define recommended torquing, mounting, calibrating, and aligning procedures and settings, as appropriate.
- 10) Describe recommended procedures to check and test equipment following corrective maintenance.
- c. Equipment Troubleshooting:
 - 1) Define recommended systematic troubleshooting procedures.
 - 2) Provide component-specific troubleshooting checklists.
 - 3) Describe applicable materials and equipment testing and diagnostic procedures to facilitate troubleshooting.
 - 4) Describe common corrective maintenance procedures with “hands-on” demonstrations.
4. Instrumentation/Controls and Electrical Maintenance Training:
 - a. Materials and Equipment Overview: As described in Paragraph 1.4.D.1 of this Section.
 - b. Preventative Maintenance and Troubleshooting of Instrumentation and Control Systems: In accordance with Section 40 90 09, Plant Monitoring and Control System Training. ENGINEER may grant waiver(s) to allow all training for a given system to be at the location of OWWNER’s training facility.
 - c. Preventative Maintenance and Troubleshooting of Other Electrical Systems: In accordance with requirements for Paragraph 1.4.D.3 of this Section.

1.5 TRAINING AIDS

- A. Manufacturer’s instructor shall incorporate training aids as appropriate to assist in the instruction. Furnish handouts of text, tables, graphs, and illustrations as required. Other appropriate training aids include:
 1. Audio-visual aids, such as videos, Microsoft PowerPoint presentations, overhead transparencies, posters, drawings, diagrams, catalog sheets, or other items.
 2. Equipment cutaways and samples, such as spare parts and damaged equipment.
 3. Tools, such as repair tools, customized tools, and measuring and calibrating instruments.
- B. Handouts:
 1. Manufacturer’s instructor shall distribute and use descriptive handouts during training. Customized handouts developed especially for training for the Project are encouraged.
 2. Photocopied handouts shall be good quality and completely legible.
 3. Handouts should be coordinated with the instruction, with frequent references made to the handouts.

4. Provide not less than 15 copies of each handout for each training session.
- C. Audio-visual Equipment: Training provider shall provide audio-visual equipment required for training sessions. If suitable equipment is available at the Site, OWNER may make available OWNER's audio-visual equipment; however, do not count on OWNER providing audio-visual equipment. Audio-visual equipment that training provider shall provide, as required, includes:
1. Laptop computer, presentation software, and suitable projector.
 2. As required, extension cords and spare bulb for projector.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TRAINING DELIVERY

- A. Training Delivery – General:
1. Instructors shall be fully prepared for the training sessions. Training delivery shall be communicative, clear, and proceed according to lesson plan accepted by ENGINEER, with lesson content appropriate for trainees. If OWNER or ENGINEER deems that training delivery does not to comply with the Contract Documents, training shall be postponed, rescheduled, and re-performed in acceptable manner at no additional cost to OWNER.
 2. Trainee Sign-in Sheets: In format acceptable to OWNER, furnish sign-in sheet for trainees for each session. Sign-in sheets shall include the Project name, equipment or system for which training was furnished, and type of training (e.g., operations, mechanical maintenance, instrumentation/controls maintenance, or other), and name of each trainee. Upon completion of training, submit copy of each sign-in sheet as indicated in Article 1.3 of this Section.
- B. “Hands-on” Demonstrations:
1. Manufacturer's instructor shall present “hands-on” demonstrations of operations and maintenance of materials and equipment for each training session, in accordance with lesson plan accepted by ENGINEER.
 2. CONTRACTOR and manufacturer shall furnish tools necessary for demonstrations.

3.2 TRAINING SCHEDULE

- A. Manufacturer shall furnish not less than the hours of training and number of sessions indicated in Table 01 79 23-A of this Section. Travel time and expenses are responsibility of manufacturer and are excluded from required training time indicated in the Contract Documents.

- B. Shifts and Training Sessions Required:
1. Operations at the Site take place 24 hours per day, divided into three shifts as follows: day, evening, and night shift.
 2. Training Sessions per Shift:
 - a. Operators: Maximum training per day is four hours; sessions longer than four hours shall be spread over multiple, preferably consecutive, days. Provide identical training sessions as follows:
 - 1) Two identical sessions during day shift, each session in a different week.
 - 2) One session during evening shift.
 - 3) One session during night shift.
 - b. Mechanical Maintenance: Provide two identical training sessions during day shift, each session in a separate week, for indicated equipment. Maximum training per day is four hours; sessions longer than four hours shall be spread over multiple, preferably consecutive, days.
 - c. Instrument/Controls and Electrical Maintenance: Provide two identical training sessions during day shift, each session in a separate week, for indicated equipment. Maximum training per day is four hours; sessions longer than four hours will be spread over multiple, preferably consecutive, days.

TABLE 01 79 23-A, TRAINING SUMMARY TABLE

Material or Equipment	Specification Section	Total Training Time (hours)	Training Sessions Required		
			Operations	Mechanic Maint.	Instrument/ Controls & Electrical Maint.
Sectional doors and motors	08 36 16	2	X	X	X
Wet-pipe sprinkler systems	21 13 13	2	X	X	NA
Dry-pipe sprinkler systems	21 13 16	2	X	X	NA
Gas-fired unit heaters	23 82 39.63	2	X	X	X
Oil and stormwater separators	33 44 36	2	X	X	NA
Total		10	1 each	1 each	1 each

+ + END OF SECTION + +

SECTION 02 41 00

DEMOLITION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified and required for demolition, removal, and disposal Work.
2. The Work under this Section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of structural concrete, foundations, walls, doors, windows, structural steel, metals, roofs, masonry, attachments, appurtenances, piping, electrical and mechanical systems and equipment, paving, curbs, sidewalks, gutters, fencing and similar existing facilities.
 - b. Demolition and removal of all Underground Facilities underneath, and above-grade piping and utilities in, the building(s) and structures shown or indicated for demolition, unless the Underground Facilities or above-grade facilities are shown or indicated as to remain.
 - c. Remove from slabs, foundations, walls, and footings that are to be demolished all utilities and appurtenances embedded in such construction.
3. Demolitions and removals specified under other Sections shall comply with requirements of this Section.
4. Perform demolition Work within areas shown or indicated.
5. Pay all costs associated with transporting and, as applicable, disposing of materials and equipment resulting from demolition.

B. Coordination:

1. Comply with Section 01 41 16, Coordination with Owner's Operations.
2. Review procedures under this and other Sections and coordinate the Work that will be performed with or before demolition and removals.
3. Notify other contractors in advance of demolition and removals Work to provide other contractors with sufficient time for performing work and coordinating items included in their contracts that will be performed before or in conjunction with demolition and removals Work.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.

2. Plumbing Removals: Entity and personnel performing plumbing removals shall be plumber legally qualified to perform plumbing construction and plumbing work in the jurisdiction where the Site is located.
- B. Regulatory Requirements:
1. Demolition, removal, and disposal Work shall be in accordance with 29 CFR 1926.850 through 29 CFR 1926.860 (Subpart T - Demolition), and all other Laws and Regulations.
 2. Comply with requirements of authorities having jurisdiction.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
1. Procedure Submittals:
 - a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.
 - 2) Other proposed procedures as applicable.
 - 3) Equipment proposed for use in demolition operations.
 - 4) Recycling/disposal facility(ies) proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 5) Planned demolition operating sequences.
 - 6) Detailed schedule of demolition Work in accordance with the accepted Process Schedule.
 2. Notification of Intended Demolition Start: Submit in accordance with Paragraph 3.1.A of this Section.
 3. Qualifications Statements:
 - a. Name and qualifications of entity performing electrical removals, including copy of licenses required by authorities having jurisdiction.
 - b. Name and qualifications of entity performing plumbing removals, including copy of licenses required by authorities having jurisdiction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION

- A. Notification:
1. At least 48 hours prior to commencing demolition or removal, notify Engineer in writing of planned start of demolition Work. Do not start removals without permission of Engineer.

- B. Protection of Surrounding Areas and Facilities:
1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, structures and properties.
 2. Closing or obstructing of roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Conduct the Work with minimum interference to vehicular and pedestrian traffic.
 3. Provide temporary barriers, lighting, sidewalk sheds, and other necessary protection.
 4. Repair damage to facilities that are to remain.
- C. Existing Utilities: In addition to requirements of the General Conditions, Supplementary Conditions, and Division 01 Specifications, do the following:
1. Should uncharted or incorrectly charted Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
 2. Sanitary Sewer: Before proceeding with demolition, locate and cap all sewer lines and service laterals discharging from the building or structure being demolished.
 3. Storm Water: Existing storm water system shall remain in place until demolitions of existing building or structure is completed. Upon completing demolition, cut and cap storm sewer laterals at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities.
 4. Water Piping: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished.
 5. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
 6. Shutdown of utility services shall be coordinated by Contractor, assisted by Owner as required relative to contacting utility owners.

3.2 DEMOLITION – GENERAL

- A. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.
- B. Pollution Controls:

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level. Comply with Section 01 57 05, Temporary Controls, and Laws and Regulations.
 2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
 3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions and Section 01 74 05, Cleaning.
- C. Explosives:
1. Do not bring explosives to the Site or use explosives without written consent of Owner and authorities having jurisdiction. Obtaining such written consent will not relieve Contractor of responsibility for injury or damage caused by Contractor's blasting operations.
 2. Perform blasting, when permitted, in compliance with Laws and Regulations, and blasting plan accepted by Engineer.
- D. Comply with Section 01 73 29, Cutting and Patching.
- E. Building or Structure Demolition:
1. Unless otherwise approved by Engineer, proceed with demolition from top of building or structure to the ground. Complete demolition Work above each floor or tier before disturbing supporting members of lower levels.
 2. Demolish concrete and masonry in small sections.
 3. Remove structural framing members and lower to ground using hoists, cranes, or other suitable methods. Do not throw or drop to the ground.
 4. Break up and remove foundations and slabs-on-grade unless otherwise shown or indicated as remaining in place.
- F. Demolition of Site Improvements:
1. Pavement, Sidewalks, Curbs, and Gutters: Demolition of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, shall terminate at cut edges. Edges shall be linear and have a vertical cut face.
 2. Fencing, Guardrails, and Bollards: Remove to the limits shown or indicated on the Drawings. Completely remove below-grade posts and concrete.
 3. Manholes, Vaults, Chambers, and Handholes: Remove to the limits shown or indicated on the Drawings.
 4. Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes: Remove to the extent shown or indicated on the Drawings. Unless otherwise shown or indicated, cap ends of piping to remain in place in accordance with the "Mechanical Removals" Article in this Section.
 5. Landscaping: Comply with Section 33 11 00, Clearing and Grubbing.
- G. Salvage and Ownership:
1. Refer to Section 01 12 13, Summary of Work, for requirements on salvage, ownership, and handling of equipment and materials removed during demolition and removal Work.

2. Materials and equipment to remain Owner's property shall be carefully removed and appropriately handled by Contractor to avoid damage and invalidation of warranties in effect, and shall be cleaned and stored at the Site (or other site specified in the Contract Documents) at place designated by Engineer or Owner.
- H. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.3 STRUCTURAL REMOVALS

- A. Remove structures to lines and grades shown or indicated, unless otherwise directed by Engineer. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's expense and such excess removals shall be reconstructed to satisfaction of Engineer without additional cost to Owner.
- B. Recycling and Reuse of Demolition Materials:
1. All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in or upon building or structure to be demolished shall be removed, transported, and disposed of away from the Site, unless otherwise approved by Engineer.
 2. Do not use demolished materials as fill or backfill adjacent to structures, in pipeline trenches, or as subbase under structures or pavement.
- C. After removing concrete and masonry walls or portions thereof, slabs, and similar construction that ties in to the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.
- D. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.
1. Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners that will result in neat joints with new construction and be satisfactory for the purpose intended.
 2. Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.
 3. Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 inches below the final surface. Repair the resulting hole, with repair mortar for concrete and grout for masonry, to be flush with the surface.

4. Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.
- E. Where equipment or material anchored to concrete or masonry are removed and anchors are not to be re-used, remove the anchors to not less than 1.5 inches beneath surface of concrete or masonry member. Repair the resulting hole, using repair mortar for concrete and grout for masonry, to be flush with the surface. Alternately, when the anchor is stainless steel, the anchor may be cut flush with the surface of the concrete or masonry, when so approved by Engineer.
- F. Jambs, sills and heads of windows, passageways, doors, or other openings (as applicable) cut-in to the Work or to existing construction shall be dressed with masonry, concrete, or metal to provide smooth, finished appearance.
- G. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Section, unless specified elsewhere in the Contract Documents.

3.4 MECHANICAL REMOVALS

- A. Mechanical demolition and removal Work includes dismantling and removing existing piping, ductwork, pumps, equipment, tanks, and appurtenances as shown, indicated, and required for completion of the Work. Mechanical removals include cutting and capping as required, except that cutting of existing piping and ductwork to make connections is included under Section 01 14 16, Coordination with Owner's Operations; Section 01 73 29, Cutting and Patching; and applicable Sections of Division 40, Process Integration.
- B. Demolition and Removals of Piping, Ductwork, and Similar Items:
 1. Purge piping and tanks (as applicable) of chemicals or fuel (as applicable) and make safe for removal and capping. Remove to the extent shown or indicated existing process, water, waste and vent, chemical, gas, fuel, and other piping. Remove piping to the nearest solid piping support, and provide caps on ends of remaining piping. Where piping to be demolished passes through existing walls to remain, cut off and cap pipe on each side of the wall.
 2. Caps, Closures, Blind Flanges, and Plugs:
 - a. Provide closure pieces, such as blind flanges and caps, where shown or required to complete the Work.
 - b. Where used in this Section, the term "cap" means the appropriate type closure for the piping or ductwork being closed, including caps, blind flanges, and other closures.
 - c. Caps shall be compatible with the piping or ductwork to which the cap is attached, fluid-tight and gastight, and appropriate for the fluid or gas conveyed in the pipe or duct.
 - d. Unless otherwise shown or indicated, caps shall be mechanically fastened, fused, or welded to pipe or duct. Plug piping with means other

than specified in this Section only when so shown or indicated in the Contractor Documents or when allowed by Engineer.

3. When Underground Facilities are altered or removed, properly cut and cap piping left in place, unless otherwise shown or indicated.
4. Remove waste and vent piping, and ductwork to extent shown and cap as required. Where demolished vent piping, stacks, and ductwork passes through existing roofing, patch the roof with the same or similar materials. Completed patch shall be watertight and comply with roofing manufacturer's recommendations.
5. Modifications to potable water piping and other plumbing and heating system work shall comply with Laws and Regulations. All portions of potable water system that have been modified or opened shall be hydrostatically tested and disinfected in accordance with the Contract Documents, and Laws and Regulations. Hydrostatically test other, normally-pressurized, plumbing piping and heating piping.

C. Equipment Demolition and Removals:

1. To the extent shown or indicated, remove existing process equipment; pumps; storage tanks; hoisting and conveying equipment; heating, ventilating, and air conditioning equipment; generators; and other equipment.
2. Where required, disassemble equipment to avoid imposing excessive loading on supporting walls, floors, framing, facilities, and Underground Facilities. Disassemble equipment as required for access through and egress from building or structure. Disassembly shall comply with Laws and Regulations. Provide required means to remove equipment from building or structure.
3. Remove control panels, operator stations, and instruments associated with equipment being removed, unless shown or indicated otherwise.
4. Remove fuel appurtenances as applicable, including fuel storage tanks. Dispose of tank contents in accordance with Laws and Regulations.
5. Remove equipment supports as applicable, anchorages, base, grout, and piping. Remove anchorage systems in accordance with the "Structural Removals" Article in this Section. Remove small-diameter piping back to header unless otherwise indicated.
6. Remove access platforms, ladders, and stairs related to equipment being removed, unless otherwise shown or indicated.

3.5 ELECTRICAL REMOVALS

- A. Electrical demolition Work includes removing existing transformers, distribution switchboards, control panels, motors, starters, conduit and raceways, cabling, poles and overhead cabling, panelboards, lighting fixtures, switches, and miscellaneous electrical equipment, as shown, specified, or required.
- B. Remove existing electrical equipment and fixtures to avoid damaging systems to remain, to keep existing systems in operation, and to maintain integrity of grounding systems.

- C. Remove or modify motor control centers and switchgear as shown or indicated. Modified openings shall be cut square and dressed smooth to dimensions required for installation of equipment.
- D. Disconnect and remove motors, control panels, and other electrical gear where shown or indicated. Motors, microprocessors and electronics, other electrical gear to be reused shall be stored in accordance with Section 01 66 00, Product Storage and Handling Requirements.
- E. Cables in conduits to be removed shall be removed back to the power source or control panel, unless otherwise shown or indicated. Verify the function of each cable before disconnecting and removing.
- F. Conduits, raceways, and cabling shall be removed where shown or indicated. Abandoned conduits concealed in floor, ceiling slabs, or in walls shall be cut flush with the slab or wall (as applicable) at point of entrance, suitably capped, and the area repaired in a flush, smooth manner acceptable to Engineer. Exposed conduits, junction boxes, other electrical appurtenances, and their supports shall be disassembled and removed. Repair all areas of the Work to prevent rusting on exposed surfaces.
- G. Conduits in Underground Facilities not scheduled for reuse shall be suitably capped watertight where each enters building or structure to remain.
- H. Where shown or indicated, remove direct burial cable. Openings in buildings for entrance of direct burial cable shall be patched with repair mortar or other material approved by Engineer for this purpose, and made watertight.
- I. Existing poles and overhead cables shall be removed or abandoned as shown and specified. Existing substation(s) and poles owned by electric utility will be removed by the electric utility. Completely remove from the Site poles not owned by electric utility and shown or indicated for removal. Make necessary arrangements with electric utility for removal of utility company's transformers and metering equipment after new electrical system has been installed and energized.
- J. Lighting fixtures, wall switches, receptacles, starters, and other miscellaneous electrical equipment, not designated as remaining as Owner's property, shall be removed and properly disposed off-Site as required.

3.6 DISPOSAL OF DEMOLITION DEBRIS

- A. Remove from the Site all debris, waste, rubbish, and material resulting from demolition operations and equipment used in demolition Work. Comply with the General Conditions, Supplementary Conditions, and Section 01 74 05, Cleaning.
- B. Transportation and Disposal:
 - 1. Non-hazardous Material: Properly transport and dispose of non-hazardous demolition debris at appropriate landfill or other suitable location, in

accordance with Laws and Regulations. Non-hazardous material does not contain Asbestos, PCBs, Petroleum, Hazardous Waste, Radioactive Material, or other material designated as hazardous in Laws and Regulations.

2. Hazardous Material: When handling and disposal of hazardous materials is included in the Work, properly transport and dispose of hazardous materials in accordance with the Contract Documents and Laws and Regulations.
- C. Submit to Engineer information required in this Section on proposed facility(ies) where demolition material will be recycled. Upon request, Engineer or Owner, shall be allowed to visit recycling facility(ies) to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and Owner.

+ + END OF SECTION + +

SECTION 03 00 05

CONCRETE

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete, reinforcing, and related materials.
 - 2. The Work includes:
 - a. Providing concrete consisting of portland cement, fine and coarse aggregates, water, and approved admixtures; combined, mixed, transported, placed, finished, and cured.
 - b. Fabricating and placing reinforcing, including ties and supports.
 - c. Design, erection, and removal of formwork.
 - d. Building into the concrete all sleeves, frames, anchorage devices, inserts, and other items required to be embedded in concrete.
 - e. Providing openings in concrete as required to accommodate Work under this and other Sections.
- B. Coordination:
 - 1. Review installation procedures under other Sections and coordinate installation of items to be installed in the concrete Work.
- C. Classifications of Concrete:
 - 1. Class “A” concrete shall be steel-reinforced and includes all concrete unless otherwise shown or indicated.
 - 2. Class “B” concrete shall be placed without forms or with simple forms, with little or no reinforcing and includes the following:
 - a. Concrete fill.
 - b. Duct banks.
 - c. Unreinforced encasements.
 - d. Curbs and gutters.
 - e. Sidewalks.
 - f. Thrust blocks.
- D. Related Sections:
 - 1. Section 05 05 33, Anchor Systems.
 - 2. Section 07 92 00, Joint Sealants.

1.2 REFERENCES

- A. Standards referenced in this Section are:

1. ACI 224R, Control of Cracking in Concrete Structures.
2. ACI 301, Specifications for Structural Concrete for Buildings.
3. ACI 304R, Guide for Measuring, Mixing, Transporting and Placing Concrete.
4. ACI 305R, Specification for Hot Weather Concreting.
5. ACI 306R, Cold Weather Concreting.
6. ACI 309R, Guide for Consolidation of Concrete.
7. ACI 318, Building Code Requirements for Structural Concrete and Commentary.
8. ACI 347, Guide to Formwork for Concrete.
9. ACI SP-66, ACI Detailing Manual.
10. ASTM A82/A82M, Specification for Steel Wire, Plain, for Concrete Reinforcement.
11. ASTM A185/A185M, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
12. ASTM A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
13. ASTM C31/C31M, Practice for Making and Curing Concrete Test Specimens in the Field.
14. ASTM C33/C33M, Specification for Concrete Aggregates.
15. ASTM C39/C39M, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
16. ASTM C42/C42M, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
16. ASTM C94/C94M, Specification for Ready-Mixed Concrete.
17. ASTM C138/C138M, Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
18. ASTM C143/C143M, Test Method for Slump of Hydraulic-Cement Concrete.
19. ASTM C150/C150M, Specification for Portland Cement.
20. ASTM C172, Practice for Sampling Freshly Mixed Concrete.
21. ASTM C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
22. ASTM C260, Specification for Air-Entraining Admixtures for Concrete.
23. ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
24. ASTM C494/C494M, Specification for Chemical Admixtures for Concrete.
25. ASTM C579, Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
26. ASTM C1064/C1064M, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
27. ASTM D1752, Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
28. ASTM E96/E96M, Test Methods for Water Vapor Transmission of Materials
29. ASTM E154, Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
30. CRD-C 572, U. S. Army Corps of Engineers Specification for Polyvinylchloride Waterstops.
31. CRSI 1MSP, Manual of Standard Practice.

1.3 QUALITY ASSURANCE

A. Laboratory Trial Batch:

1. Employ independent testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes.
2. Each concrete mix design specified shall be verified by laboratory trial batch, unless indicated otherwise.
3. Perform the following testing on each trial batch:
 - a. Aggregate gradation for fine and coarse aggregates.
 - b. Slump.
 - c. Air content.
 - d. Compressive strength based on three cylinders each tested at seven days and at 28 days.
4. Submit for each trial batch the following information:
 - a. Project identification name and number (if applicable).
 - b. Date of test report.
 - c. Complete identification of aggregate source of supply.
 - d. Tests of aggregates for compliance with the Contract Documents.
 - e. Scale weight of each aggregate.
 - f. Absorbed water in each aggregate.
 - g. Brand, type, and composition of cementitious materials.
 - h. Brand, type, and amount of each admixture.
 - i. Amounts of water used in trial mixes.
 - j. Proportions of each material per cubic yard.
 - k. Gross weight and yield per cubic yard of trial mixtures.
 - l. Measured slump.
 - m. Measured air content.
 - n. Compressive strength developed at seven days and 28 days, from not less than three test cylinders cast for each seven day and 28-day test, and for each design mix.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. List of concrete materials and concrete mix designs proposed for use. Include results of tests performed to qualify the materials and to establish the mix designs. Do not start laboratory trial batch testing until this submittal is approved by Engineer.
 - b. Laboratory Trial Batch Reports: Submit laboratory test reports for concrete cylinders, materials, and mix design tests.
 - c. Concrete placement drawings showing the location and type of all joints.
 - d. Drawings for fabricating, bending, and placing concrete reinforcing. Comply with ACI SP-66. For walls and masonry construction, provide elevations to a minimum scale of 1/4-inch to one foot. Show bar schedules, stirrup spacing, adhesive dowels, splice lengths, diagrams of bent bars, arrangements, and assemblies, as required for fabricating and

- placing concrete reinforcing.
 - 2. Product Data:
 - a. Manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
 - 3. Samples:
 - a. Samples: Submit samples of materials as specified and as otherwise requested by Engineer, including names, sources, and descriptions.
- B. Informational Submittals: Submit the following:
- 1. Delivery Tickets: Copies of all delivery tickets for each load of concrete delivered to or mixed at the Site. Each delivery tickets shall contain the information in accordance with ASTM C94/C94M along with project identification name and number (if any), date, mix type, mix time, quantity and amount of water introduced.
 - 2. Site Quality Control Submittals:
 - a. Report of testing results for testing of field concrete cylinders for each required time period. Submit within 24 hours after completion of associated test. Test report shall include results of all testing required at time of sampling.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Transportation, Delivery, and Handling:
- 1. Deliver concrete reinforcing products to Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings on approved Shop Drawings.
 - 2. Materials used for concrete shall be clean and free from foreign matter during transportation and handling, and kept separate until measured and placed into concrete mixer.
 - 3. Implement suitable measures during hauling, piling, and handling to ensure that segregation of coarse and fine aggregate particles does not occur and grading is not affected.
 - 4. Deliver grout materials from manufacturers in unopened containers that bear intact manufacturer labeling.
 - 5. Comply with Section 01 65 00, Product Delivery Requirements.
- B. Storage:
- 1. Store formwork materials above ground on framework or blocking. Cover wood for forms and other accessory materials with protective, waterproof covering. Provide for adequate air circulation or ventilation under cover.
 - 2. Store concrete reinforcing materials to prevent damage and accumulation of dirt and excessive rust. Store on heavy wood blocking so that reinforcing does not come into contact with the ground. Space framework or blocking supports to prevent excessive deformation of stored materials.
 - 3. Store concrete joint materials on platforms or in enclosures or covered to prevent contact with ground and exposure to weather and direct sunlight.

4. For storage of concrete materials, provide bins or platforms with hard, clean surfaces.
5. Comply with Section 01 66 00, Product Storage and Handling Requirements.

PART 2 – PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I/II.
- B. Aggregates: ASTM C33/C33M.
 1. Fine Aggregate: Clean, sharp, natural sand free of loam, clay, lumps, and other deleterious substances. Dune sand, bank run sand, and manufactured sand are unacceptable.
 2. Coarse Aggregate:
 - a. Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter.
 - b. Coarse aggregate shall comply with the following:
 - 1) Crushed stone, processed from natural rock or stone.
 - 2) Washed gravel, either natural or crushed. Slag, pit gravel, and bank-run gravel are not allowed.
 - c. Coarse Aggregate Size: ASTM C33/C33M, Nos. 57 or 67, unless otherwise approved by Engineer.
- C. Water: Clean, potable.
- D. Admixtures:
 1. Air-Entraining Admixture: ASTM C260.
 2. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 3. Water Reducing and Set-Adjusting Admixtures: ASTM C494/C494M, Types D and E.
 4. High Range Water-Reducing Admixture: ASTM C494/C494M, Type F/G.
 5. Use only admixtures that have been tested and approved in the mix designs.
 6. Do not use calcium chloride or admixtures containing chloride ions.

2.2 CONCRETE MIX

- A. General:
 1. Normal weight: 145 pounds per cubic foot.
 2. Use air-entraining admixture in all concrete. Provide not less than four percent, nor more than eight percent, entrained air for concrete exposed to freezing and thawing, and provide from three to five percent entrained air for other concrete.
- B. Proportioning and Design of Class “A” Concrete Mix:
 1. Minimum compressive strength at 28 days: 5000 psi.
 2. Maximum water-cement ratio by weight: 0.4.

3. Minimum cement content: 564 pounds per cubic yard.
- C. Proportioning and Design of Class “B” Concrete Mix:
1. Minimum compressive strength at 28 days: 5000 psi.
 2. Maximum water-cement ratio by weight: 0.4.
 3. Minimum cement content: 517 pounds per cubic yard.
- D. Slump Limits:
1. Proportion and design mixes to result in concrete slump at point of placement of not less than one inch and not more than four inches.
 2. When using high-range water reducers, slump prior to addition of admixture shall not exceed three inches. Slump after adding admixture shall not exceed eight inches at point of placement.
- E. Adjustment of Concrete Mixes:
1. Concrete mix design adjustments may be requested by Contractor when warranted by characteristics of materials, Site conditions, weather, test results, or other, similar circumstances.
 2. Submit for Engineer’s approval laboratory test data for adjusted concrete mix designs, including compressive strength test results.
 3. Implement adjusted mix designs only after Engineer’s approval.
 4. Adjustments to concrete mix designs shall not result in additional costs to Owner.

2.3 FORM MATERIALS

- A. Provide form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection. Contractor shall be responsible for designing the formwork system to resist all applied loads including pressures from fluid concrete and construction loads.
- B. Smooth Form Surfaces: Acceptable panel-type to provide continuous, straight, smooth, as-cast surfaces in accordance with ACI 301.
- C. Unexposed Concrete Surfaces: Material to suit project conditions.
- D. Provide 3/4-inch chamfer at all external corners. Chamfer is not required at re-entrant corners unless otherwise shown or indicated.
- E. Form Ties:
1. Provide factory-fabricated, removable, or snap-off metal form ties, that prevent form deflection and prevent spalling of concrete surfaces upon removal. Materials used for tying forms are subject to approval of Engineer.
 2. Unless otherwise shown or indicated, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1.5 inches from outer surface of concrete. Unless otherwise shown or indicated, provide form ties that, upon removal, will leave a uniform, circular hole not larger than one-inch diameter in the concrete surface.

3. Ties for exterior walls, below-grade walls, and walls subject to hydrostatic pressure shall be provided with waterstops.
4. Wire ties are unacceptable.

2.4 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 deformed bars.
- B. Welded Wire Fabric: ASTM A185/A185M.
- C. Steel Wire: ASTM A82/A82M.
- D. Provide supports for reinforcing including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing in place.
 1. Use wire bar-type supports complying with CRSI MSP1 recommendations, except as specified in this Section. Do not use wood, brick, or other unacceptable materials.
 2. For slabs on grade, use precast concrete blocks, four inches square minimum with compressive strength equal to or greater than the surrounding concrete, or supports with sand plates or horizontal runners where base materials will not support chair legs.
 3. For all concrete surfaces where legs of supports are in contact with forms, provide supports having either hot-dip galvanized, plastic-protected, or stainless steel legs in accordance with CRSI MSP1.
 4. Provide precast concrete supports over waterproof membranes.
- E. Adhesive Dowels:
 1. Dowels:
 - a. Dowel reinforcing bars shall comply with ASTM A615, Grade 60.
 2. Adhesive:
 - a. For requirements for adhesive, refer to Section 05 05 33, Anchor Systems.

2.5 RELATED MATERIALS

- A. Waterstops:
 1. PVC Waterstops:
 - a. Manufacturers: Provide products of one of the following:
 - 1) W.R. Meadows, Inc.
 - 2) Greenstreak Plastic Products Company.
 - 3) Or equal.
 - b. Waterstops shall comply with CRD-C 572. Do not use reclaimed or scrap material.
 - c. Minimum Thickness: 3/8-inch.
 - d. Provide waterstops with minimum of seven ribs equally spaced at each end on each side with the first rib located at the edge. Each rib shall be minimum 1/8-inch in height.
 - e. Construction Joints: Waterstops shall be six-inch wide flat-strip type.

- f. Expansion Joints: Waterstops shall be nine-inch wide centerbulb type.
- 2. Hydrophilic Waterstops:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Duroseal Gasket, by BBZ USA, Inc.
 - 2) Adeka Ultraseal MC-2010M, by Asahi Denka Kogyo K.K.
 - 3) Hydrotite, by Greenstreak Plastic Products Company.
 - 4) Or equal.
 - b. Hydrophilic waterstop materials shall be bentonite-free and shall expand by minimum of 80 percent of dry volume in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast.
 - c. Waterstop material shall be composed of resins and polymers that absorb water and cause a completely reversible and repeatable increase in volume.
 - d. Waterstop material shall be dimensionally stable after repeated wet-dry cycles with no deterioration of swelling potential.
 - e. Select material in accordance with manufacturer's recommendations for type of liquid to be contained.
 - f. Minimum cross-sectional dimensions: 3/16-inch by 3/4-inch.
 - g. Location of hydrophilic waterstops shall be as shown or indicated on the Drawings, or where approved by Engineer.
 - h. Hydrophilic Sealant: Shall adhere firmly to concrete, metal, and PVC in dry or damp condition and be indefinitely elastic when cured.
 - 1) Products and Manufacturers: Provide one of the following:
 - a) Duroseal Paste, by BBZ USA, Inc.
 - b) Adeka Ultraseal P-201, by Asahi Denka Kogyo K.K.
 - c) Hydrotite, by Greenstreak Plastic Products Company.
 - d) Or equal.
- B. Vapor Retarder:
 - 1. Products and Manufacturers: Provide one of the following:
 - a. Stego Wrap 10-mil Vapor Retarder, by Stego Industries LLC.
 - b. Griffolyn 10-mil, by Reef Industries.
 - c. Moistop Ultra, by Fortifiber Industries.
 - d. Or equal.
 - 2. Vapor retarder membrane shall comply with the following.
 - a. Water Vapor Transmission Rate, ASTM E96/E96M: 0.04 perms or lower.
 - b. Water Vapor Retarder, ASTM E1745: Meets or exceeds Class C.
 - c. Thickness of Retarder (plastic), ACI 302 1R: Not less than 10 mils.
 - d. Provide accessories by same manufacturer as vapor retarder.
- C. Membrane-Forming Curing Compound: ASTM C309, Type I.
- D. Epoxy Bonding Agent:
 - 1. Two-component epoxy resin bonding agent.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Sikadur 32, Hi-Mod LPL, by Sika Corporation.
 - b. Eucopoxy LPL, by the Euclid Chemical Company.

- c. Or equal.
- E. Epoxy-Cement Bonding Agent:
 - 1. Three-component blended epoxy resin-cement bonding agent.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Sika Armatec 110 EpoCem, by Sika Corporation.
 - b. Duralprep A.C., by Euclid Chemical Company.
 - c. Or equal.
- F. Preformed Expansion Joint Filler:
 - 1. Provide preformed expansion joint filler complying with ASTM D1752, Type I (sponge rubber) or Type II (cork).
- G. Joint Sealant and Accessories:
 - 1. For joint sealants and accessories used on isolation joints, control joints, and expansion joints, refer to Section 07 92 00, Joint Sealants.

2.6 GROUT

- A. Non-shrink Grout:
 - 1. Pre-packaged, non-metallic, cementitious grout requiring only the addition of water at the Site.
 - 2. Minimum 28-day Compressive Strength: 7,000 psi.
 - 3. Products and Manufacturers: Provide one of the following:
 - a. NS Grout by Euclid Chemical Company.
 - b. Set Grout by Master Builders, Inc.
 - c. NBEC Grout by Five Star Products, Inc.
 - d. Or equal.
- B. Epoxy Grout:
 - 1. Pre-packaged, non-shrink, non-metallic, 100 percent solids, solvent-free, moisture-insensitive, three-component epoxy grouting system.
 - 2. Minimum Seven-day Compressive Strength: 14,000 psi, when tested in accordance with ASTM C579.
 - 3. Products and Manufacturers: Provide one of the following:
 - a. Euco High Strength Grout, by Euclid Chemical Company.
 - b. Sikadur 42, Grout Pak, by Sika Corporation.
 - c. Five Star Epoxy Grout, by Five Star Products, Inc.
 - d. Or equal.
- C. Grout Fill:
 - 1. Grout mix shall consist of cement, fine and coarse aggregates, water, and admixtures complying with requirements specified in this Section for similar materials in concrete.
 - 2. Proportion and mix grout fill as follows:
 - a. Minimum Cement Content: 564 pounds per cubic yard.
 - b. Maximum Water-Cement Ratio: 0.45.
 - c. Maximum Coarse Aggregate size: 1/2-inch, unless otherwise indicated.

- d. Minimum 28-day Compressive Strength: 4,000 psi.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Contractor shall examine the substrate and the conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 FORMWORK

- A. Construct formwork in accordance with ACI 347 such that concrete members and structures are of correct size, shape, alignment, elevation, and position.
- B. Provide openings in formwork to accommodate the Work of other trades. Accurately place and securely support items required to be built into formwork.
- C. Clean and adjust forms prior to placing concrete. Apply form release agents or wet forms as required. Re-tighten forms during and after concrete placing, when required, to eliminate cement paste leaks.
- D. Removing Formwork:
 - 1. Comply with ACI 301 and ACI 347, except as otherwise indicated in the Contract Documents.
 - 2. Do not remove formwork and shoring until supported concrete members have acquired minimum of 90 percent of specified compressive strength. Results of suitable quality control tests of field-cured specimens may be submitted to Engineer for review as evidence that concrete has attained sufficient strength for removal of supporting formwork and shoring prior to removal times indicated in the Contract Documents.
 - 3. Removal time for formwork is subject to Engineer's acceptance.
 - 4. Repair form tie-holes following in accordance with ACI 301.

3.3 REINFORCING, JOINTS, AND EMBEDDED ITEMS

- A. Comply with the applicable recommendations of Laws and Regulations and standards referenced in this Section, including CRSI MSP1, for details and methods of placing and supporting reinforcing.
- B. Clean reinforcing to remove loose rust and mill scale, earth, ice, and other materials which act to reduce or destroy bond between reinforcing material and concrete.
- C. Position, support, and secure reinforcing against displacement during formwork construction and concrete placing. Locate and support reinforcing by means of metal chairs, runners, bolsters, spacers, and hangers, as required.

1. Place reinforcing to obtain minimum concrete coverages as shown on the Drawings and as required in ACI 318. Arrange, space, and securely tie bars and bar supports together with 16-gage wire to hold reinforcing accurately in position during concrete placing. Set with ties so that twisted ends are directed away from exposed concrete surfaces.
 2. Do not secure reinforcing to formwork using wire, nails or other ferrous metal. Metal supports subject to corrosion shall not be in contact with formed or exposed concrete surfaces.
- D. Provide sufficient quantity of supports of strength required to carry reinforcing. Do not place reinforcing more than two inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- E. Splices: Provide standard reinforcing splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown or indicated for minimum lap of spliced bars, (as shown on the Drawings).
- F. Install welded wire fabric in lengths as long as practical, lapping adjoining sections a minimum of one full mesh.
- G. Do not place concrete until reinforcing is inspected and Engineer indicates that conditions are acceptable for placing concrete. Concrete placed in violation of this paragraph will be rejected. Notify Engineer in writing at least two working days prior to proposed concrete placement.
- H. Joints:
1. Provide construction, isolation, expansion, and control joints as indicated or required. Locate construction joints so as to not impair the strength and appearance of the structure. Place isolation and control joints in slabs-on-grade to stabilize differential settlement and random cracking.
 2. In walls, locate joints at a maximum spacing of 40 feet and approximately 12 feet from corners.
 3. In foundation slabs and slabs-on-grade, locate joints at intervals of approximately 40 feet.
 4. In mats and structural slabs and beams, locate joints in compliance with ACI 224R.
 5. Locations of joints shall be in accordance with the Contract Documents and as approved by Engineer in the Shop Drawings.
 6. Where construction joints are indicated to be roughened, intentionally roughen surfaces of previously-placed concrete to amplitude of 1/4-inch.
- I. Installation of Embedded Items: Set and build into the Work anchorage devices and embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting diagrams, templates, for locating and setting. Refer to Paragraph 1.1.B of this Section. Do not embed in concrete uncoated aluminum items. Where aluminum items are in contact with concrete surfaces, coat aluminum to prevent direct contact with concrete.

J. Adhesive Dowels:

1. Adhesive dowels shall be reinforcing bar dowels set in an adhesive in hole drilled into hardened concrete. Comply with adhesive system manufacturer's installation instructions regarding hole diameter, drilling method, embedment depth required to fully develop required tensile strength, and hole cleaning and preparation instructions. Unless more-stringent standards are required by adhesive system manufacturer, comply with the following.
2. Drill holes to adhesive system manufacturer's recommended diameter and depth to develop required tensile strength. Holes shall not be more than 1/4-inch greater than nominal bar diameter, and hole depth shall not be less than twelve times nominal bar diameter. Hammer-drill holes. Cored holes are not allowed.
3. Embedment depths shall be based on concrete compressive strength of 2,000 psi when embedded in existing concrete, and 4,000 psi when embedded in new concrete.
4. Determine location of existing reinforcing steel in vicinity of proposed holes prior to drilling. Adjust location of holes to be drilled to avoid drilling through or damaging existing reinforcing bars only when approved by Engineer.
5. Before setting adhesive dowel, hole shall be free of dust and debris using method recommended by adhesive system manufacturer. Hole shall be brushed, with manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.
6. Inject adhesive into hole through injection system mixing nozzle and necessary extension tubes, placed to bottom of hole. Withdraw discharge end as adhesive is placed, but keep end of tube immersed to prevent forming air pockets. Fill hole to depth that ensures that excess material is expelled from hole during dowel placement.
7. Twist dowels during insertion into partially-filled hole to guarantee full wetting of bar surface with adhesive. Insert bar slowly to avoid developing air pockets.

3.4 CONCRETE PLACING

- A. Site Mixing: Use drum-type batch machine mixer, mixing not less than 1.5 minutes for one cubic yard or smaller capacity. Increase required mixing time by minimum of 15 seconds for each additional cubic yard or fraction thereof.
- B. Ready-Mixed Concrete: Comply with ASTM C94/C94M.
- C. Concrete Placing:
 1. Place concrete in a continuous operation within planned joints or sections in accordance with ACI 304R.
 2. Do not begin placing concrete until work of other trades affecting concrete is completed.
 3. Wet concrete and subgrade surfaces to saturated surface dry condition immediately prior to placing concrete.

4. Deposit concrete as near its final location as practical to avoid segregation due to re-handling or flowing.
 5. Avoid separation of the concrete mixture during transportation and placing. Concrete shall not free-fall for distance greater than four feet during placing.
 6. Complete concrete placing within 90 minutes of addition of water to the dry ingredients.
- D. Consolidate placed concrete in accordance with ACI 309R using mechanical vibrating equipment supplemented with hand rodding and tamping, such that concrete is worked around placing and other embedded items and into all parts of formwork. Insert and withdraw vibrators vertically at uniformly-spaced locations. Do not use vibrators to transport concrete within the formwork. Vibration of formwork or placing is not allowed.
- E. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing.
1. In hot weather comply with ACI 305R.
 2. In cold weather comply with ACI 306R.

3.5 QUALITY OF CONCRETE WORK

- A. Make concrete solid, compact, smooth, and free of laitance, cracks, and cold joints.
- B. Concrete for liquid-retaining structures and concrete in contact with earth, water, or exposed directly to the elements shall be watertight.
- C. Cut out and properly replace to extent directed by Engineer, or repair to satisfaction of Engineer, surfaces that contain cracks or voids, are unduly rough, or are in defective in any way. Patches or plastering are unacceptable.
- D. Repair, removal and replacement of defective concrete directed by Engineer shall be at no additional cost to Owner.

3.6 CURING

- A. Begin initial curing as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Continue curing by using moisture-retaining cover or membrane-forming curing compound. Cure formed surfaces by moist curing until formwork is removed. Provide protection, as required, to prevent damage to exposed concrete surfaces. Total curing period shall not be less than seven days. Curing methods and materials shall be compatible with scheduled finishes.

3.7 FINISHING

- A. Slab Finish:
1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when surface water has disappeared or when concrete

has stiffened sufficiently. Use a wood float only. Check and level surface plane to a tolerance not exceeding 1/4-inch in ten feet when tested with a ten foot straightedge placed on the surface at not less than two different angles. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, re-float the surface to a uniform, smooth, granular texture. Slab surfaces shall receive a float finish. Provide additional trowel finishing as required in this Section.

2. After floating, begin first trowel finish operation using power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over the surface.
 3. Consolidate concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8-inch in ten feet when tested with a ten-foot straightedge. Grind smooth surface defects that would telegraph through applied floor covering system.
 4. Use trowel finish for the following:
 - a. Interior exposed slabs, unless otherwise shown or indicated.
 - b. Apply non-slip broom finish, after troweling, to exterior concrete slab and elsewhere as shown.
- B. Apply chemical floor hardener to exposed interior concrete floor areas when cured and dry, in accordance with hardener manufacturer's instructions.
- C. Formed Finish:
1. Provide smooth form concrete finish at exposed surfaces. Use largest practical form panel sizes to minimize form joints. Exposed surfaces include interior water-contacting surfaces of tanks, whether or not directly visible. All surfaces shall be considered as exposed, unless buried or covered with permanent structural or architectural material. After removing forms, patch form tie holes and defects in accordance with ACI 301. Remove fins exceeding 1/8-inch in height. Where surface will be coated or will receive further treatment, remove all fins flush with concrete surface.
 2. Provide rough form finish at all unexposed surfaces. After removing forms, patch form tie holes and defects in accordance with ACI 301. Remove fins exceeding 1/2-inch in height.

3.8 GROUT PLACING

- A. Place grout as shown and indicated, and in accordance with grout manufacturer's instructions and recommendations. If grout manufacturer's instructions conflict with the Contract Documents, notify Engineer and not proceed until obtaining Engineer's clarification.
- B. Dry-packing is not allowed, unless otherwise indicated.
- C. Manufacturers of proprietary grout materials shall make available upon 72 hours notice the services of qualified, full-time, factory-trained employee to aid in ensuring proper use of grout materials at the Site.

- D. Placing grout shall comply with temperature and weather limitations described in Article 3.4 of this Section.

3.9 FIELD QUALITY CONTROL

A. Site Testing Services:

1. Contractor shall employ independent testing laboratory to perform field quality control testing for concrete. Engineer will direct where samples are obtained.
2. Testing laboratory will provide all labor, material, and equipment required for sampling and testing concrete, including: scale, glass tray, cones, rods, molds, air tester, thermometer, and other incidentals required.

B. Quality Control Testing During Construction:

1. Perform sampling and testing for field quality control during concrete placing, as follows:
 - a. Sampling Fresh Concrete: ASTM C172.
 - b. Slump: ASTM C143/C143M; one test for each concrete load at point of discharge.
 - c. Concrete Temperature: ASTM C1064/C1064M; one for every two concrete loads at point of discharge, and when a change in the concrete is observed. Test each load when time from batching to placement exceeds 75 minutes.
 - d. Air Content: ASTM C231; one for every two concrete load at point of discharge, and when a change in the concrete is observed.
 - e. Unit Weight: ASTM C138/C138M; one for every two concrete loads at point of discharge, and when a change in the concrete is observed.
 - f. Compression Test Specimens:
 - 1) In accordance with ASTM C31/C31M, make one set of compression cylinders for each 50 cubic yards of concrete, or fraction thereof, of each mix design placed each day. Each set shall be four standard cylinders, unless otherwise directed by Engineer.
 - 2) Cast, store, and cure specimens in accordance with ASTM C31/C31M.
 - g. Compressive Strength Tests:
 - 1) In accordance with ASTM C39/C39M; one specimen tested at seven days, and three specimens tested at 28 days.
 - 2) Concrete that does not comply with strength requirements will be considered as defective Work.
 - h. Submit test results from certified by testing laboratory to Engineer within 24 hours of completion of test.
 - i. When there is evidence that strength of in-place concrete does not comply with the Contract Documents, Contractor shall employ the services of concrete testing laboratory to obtain cores from hardened concrete for compressive strength determination. Cores and tests shall comply with ASTM C42/C42M and the following:
 - 1) Testing of Adhesive Dowels: Owner will employ testing agency to perform field quality control testing of drilled dowel installations. After adhesive system manufacturer's recommended curing period and

prior to placing connecting reinforcing, proof-test for pullout ten percent of adhesive dowels installed. Adhesive dowels shall be tensioned to 60 percent of specified yield strength. Where dowels are located less than six bar diameters from edge of concrete, Engineer will determine tensile load required for test. If one or more dowels fail, retest all dowels installed for the Work. Dowels that fail shall be reinstalled and retested at Contractor's expense.

+ + END OF SECTION + +

SECTION 03 60 00

GROUTING

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install grout and perform grouting Work.
- B. Coordination:
1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before grouting Work.
 2. Notify other contractors in advance of grouting to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before grouting Work.
- C. Related Sections:
1. Section 03 00 05, Concrete.
- D. Application and Grout Material:
1. The following is a listing of grouting applications and the corresponding type of grout material to be provided for the associated application. Unless shown or indicated otherwise in the Contract Documents, provide grout in accordance with the following:

TABLE 03 60 00-A, GROUT APPLICATIONS AND MATERIAL TYPES

Application	Required Grout Material Type
Beam and column (one- or two-story height) base plates and precast concrete bearing less than 16 inches in the least dimension	Class II Non-Shrink
Column base plates and precast concrete bearing (greater than two-story height or larger than 16 inches in the least dimension)	Class I Non-Shrink
Base plates for storage tanks and other non-motorized equipment, and motorized equipment or machinery less than 50 horsepower	Class I Non-Shrink (unless otherwise recommended by equipment manufacturer)
Motorized equipment or machinery equal to and greater than 50 horsepower, and motorized equipment or machinery	Class III Non-Shrink Epoxy (unless otherwise recommended by equipment manufacturer)

equipment less than 50 horsepower subject to severe shock loads or high vibration	
Filling blockout spaces for embedded items such as railing posts, guide frames for hydraulic gates, and similar applications	Class II Non-Shrink (Class I where placement time exceeds 15 minutes)
Grout fill or grout toppings less than four inches thick	Grout Fill
Grout fill greater than four inches thick	Class "B" Concrete in accordance with Section 03 30 00, Cast-In-Place Concrete
Grout for setting filter underdrain blocks, and for filling voids between filter underdrain blocks, and for filling voids between filter underdrain blocks and walls	Filter Underdrain Blocks Grout
Applications not listed above, where grout is indicated on the Drawings	Class I Non-Shrink, unless shown or indicated otherwise

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ACI 211.1, Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. ACI 301, Structural Concrete for Buildings.
3. ASTM C33/C33M, Specification for Concrete Aggregates.
4. ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
5. ASTM C230/C230M, Specification for Flow Table for Use in Tests of Hydraulic Cement.
6. ASTM C531, Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
7. ASTM C579, Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
8. ASTM C827, Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
9. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
10. ASTM C939, Text Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
11. ASTM C1107/C1107M, Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
12. ASTM C1181, Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.
13. NSF/ANSI 61, Drinking Water System Components - Health Effects.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Grout Testing Laboratory:

- a. Independent testing laboratory employed for design and testing of grout materials and mixes shall comply with testing laboratory requirements in Section 03 30 00, Cast-in-Place Concrete and other applicable requirements in the Contract Documents.
 2. Manufacturer: Shall have a minimum of five years experience of producing products substantially similar to that required and shall be able to submit documentation of at least five satisfactory installations that have been in successful operation for at least five years each.
 3. Manufacturer's Field Service Technician: When required, provide services of manufacturer's full-time employee, factory-trained in handling, use, and installing the products required, with at least five years of experience in field applications of the products required.
- B. Trial Batch:
1. Each grout fill and construction joint grout mix proportion and design shall be verified by laboratory trial batch or field experience methods. Comply with ACI 211.1 and submit to Engineer a report with the following data:
 - a. Complete identification of aggregate source of supply.
 - b. Tests of aggregates for compliance with specified requirements.
 - c. Scale weight of each aggregate.
 - d. Absorbed water in each aggregate.
 - e. Brand, type, and composition of cement.
 - f. Brand, type, and amount of each admixture.
 - g. Amounts of water used in trial mixes.
 - h. Proportions of each material per cubic yard.
 - i. Unit weight and yield per cubic yard of trial mixtures.
 - j. Measured slump.
 - k. Measured air content.
 - l. Compressive strength developed at seven days and 28 days, from not less than three test specimens cast for each seven-day and 28-day test, and for each design mix.
 2. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301.
 3. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Schedule of Project-specific grout applications, installation locations, and the grout type proposed for each.
 - b. List of grout materials and proportions for the proposed mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until submittal is approved by Engineer.

- c. Trial Batch Reports: Submit laboratory test reports for grout materials and mix design tests.
 - 2. Product Data:
 - a. Data sheets, certifications, and manufacturer's specifications for all materials proposed for use.
- B. Informational Submittals: Submit the following:
- 1. Manufacturer's Instructions:
 - a. Special instructions for shipping, storing, protecting, and handling.
 - b. Installation instructions for the materials.
 - 2. Field Quality Control Submittals:
 - a. Report field testing results for each required time period. (e.g., seven-day tests, 28-day tests). Submit within 24 hours after completion of associated test. Each test report shall include results of all testing required at time of sampling.
 - 3. Supplier Reports:
 - a. Submit written report of results of each visit to Site by Supplier's field service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.
 - 4. Qualifications Statements:
 - a. Testing laboratory, when not submitted under other Sections.
 - b. Manufacturer, when submittal of qualifications is required by Engineer.
 - c. Manufacturer's field service technician, when submittal of qualifications is required by Engineer.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Storage of Materials: Store grout materials in a dry location, protected from weather and protected from moisture.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All grout materials, admixtures, cementitious materials, and other materials used in grout that contact potable water or water that will be treated to become potable shall be listed in NSF/ANSI 61.

2.2 NON-SHRINK GROUT MATERIALS

- A. General: Non-shrink grout shall be a prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or container in which the materials are packaged. Specific formulation for each type or class of non-shrink

grout specified in this Section shall be that recommended by the grout manufacturer for the particular application.

B. Class I Non-Shrink Grout:

1. Class I non-shrink grouts shall have a minimum 28-day compressive strength of 7,000 psi. Use grout for precision grouting and where water-tightness and non-shrink reliability in both plastic and hardened states is critical, in accordance with Table 03 60 00-A in this Section.
2. Products and Manufacturer: Provide one of the following:
 - a. Masterflow 928, by Master Builders, Inc.
 - b. Five Star Grout, by Five Star Products, Inc.
 - c. Hi-Flow Grout, by Euclid Chemical Company.
 - d. Or equal.
3. Comply with ASTM C1107/C1107M, Grade C and B (as modified below) when tested using amount of water required to achieve the following properties:
 - a. Fluid consistency (20 to 30 seconds) shall be in accordance with ASTM C939.
 - b. At temperatures of 45, 73.4, and 95 degrees F.
4. Length change from placing to time of final set shall not have shrinkage greater than the expansion measured at three or fourteen days. Expansion at three or fourteen days shall not exceed the 28-day expansion.
5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.
6. Fluid grout shall pass through the flow cone, with continuous flow, one hour after mixing.

C. Class II Non-Shrink Grout:

1. Class II non-shrink grouts shall have minimum 28-day compressive strength of 7,000 psi. Use grout for general-purpose grouting applications in accordance with Table 03 60 00-A in this Section.
2. Products and Manufacturer: Provide one of the following:
 - a. Construction Grout, by Master Builders, Inc.
 - b. FSP Construction Grout, by Five Star Products, Inc.
 - c. NS Grout, by Euclid Chemical Company.
 - d. Or equal.
3. Comply with ASTM C1107/C1107M and the following when tested using the quantity of water required to achieve the following properties:
 - a. Flowable consistency (140 percent flow in accordance with ASTM C230/C230M, five drops in 30 seconds).
 - b. Fluid working time of at least 15 minutes.
 - c. Flowable for at least 30 minutes.
4. When tested, grout shall not bleed at maximum allowed water.
5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.

D. Class III Non-Shrink Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, 100-percent solids system.

2. Products and Manufacturer: Provide one of the following:
 - a. E3G, by Euclid Chemical Company.
 - b. Sikadur 42 Grout Pak, by Sika Corporation.
 - c. HP Epoxy Grout, by Five Star Products, Inc.
 - d. Or equal.
3. Epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all pre-measured and prepackaged. Resin component shall not contain non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are unacceptable. Variation of component ratios is not allowed without specific recommendation by manufacturer. Manufacturer's instructions shall be printed on each container in which products are packaged.
4. The following properties shall be attained with the minimum quantity of aggregate allowed by epoxy grout manufacturer.
 - a. Vertical volume change at all times before hardening shall be between zero percent shrinkage and 4.0 percent expansion when measured in accordance with ASTM C827 (modified for epoxy grouts by using an indicator ball with specific gravity between 0.9 and 1.1).
 - b. Length change after hardening shall be less than 0.0006-inch per inch and coefficient of thermal expansion shall be less than 0.00003-inch per inch per degree F when tested in accordance with ASTM C531.
 - c. Compressive creep at one year shall be less than 0.001-inch per inch when tested under a 400-psi constant load at 140 degrees F in accordance with ASTM C1181.
 - d. Minimum seven-day compressive strength shall be 14,000 psi when tested in accordance with ASTM C579
 - e. Grout shall be capable of maintaining at least a flowable consistency for minimum of 30 minutes at 70 degrees F.
 - f. Shear bond strength to portland cement concrete shall be greater than shear strength of concrete when tested in accordance with ASTM C882/C882M.
 - g. Minimum effective bearing area shall be 95 percent.

2.3 GROUT MATERIALS OTHER THAN NON-SHRINK GROUT

- A. General: Materials for grouts (other than non-shrink grouts) shall be in accordance with Section 03 30 00, Cast-In-Place Concrete, except as otherwise specified in this Section.
- B. Grout Fill:
 1. Grout fill shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed in accordance with this Section.
 - a. Minimum Compressive Strength: 4,000 psi at 28 days.
 - b. Maximum Water-Cement Ratio: 0.45 by weight.
 - c. Coarse Aggregate: ASTM C33/C33M, No. 8 size.
 - d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate.
 - e. Air Content: Seven percent (plus or minus one percent).

- f. Minimum Cement Content: 564 pounds per cubic yard.
- g. Slump for grout fill shall be adjusted to match placing and finishing conditions, and shall not exceed four inches.

C. Construction Joint Grout:

- 1. Construction joint grout shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned with similar cementitious characteristics as Class "A" concrete specified in Section 03 30 00, Cast-In-Place Concrete. Mix design shall result in grout that is flowable with high mortar content. Mix requirements are:
 - a. Minimum Compressive Strength: 4,500 psi at 28 days.
 - b. Maximum Water-Cement Ratio: 0.42 by weight.
 - c. Coarse Aggregate: ASTM C33/C33M, No. 8 size.
 - d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate.
 - e. Air Content: Seven percent (plus or minus one percent).
 - f. Minimum Cement Content: 752 pounds per cubic yard.
 - g. Slump for Construction Joint Grout: Seven inches (plus or minus one inch).

D. Filter Underdrain Blocks Grout:

- 1. Grout shall comply with Article 2.1 of this Section. Grout shall consist of one part cement to two parts sand with shrinkage-reducing admixture. Class I or Class II non-shrink grout may be used in lieu of filter underdrain blocks grout.
 - a. Minimum Compressive Strength: 4,000 psi at 28 days.
 - b. Maximum Water-Cement Ratio: 0.45 by weight.

2.4 CURING MATERIALS

- A. Curing materials shall comply with Section 03 30 00, Cast-in-Place Concrete, and shall be as recommended by the manufacturer of prepackaged grouts.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrate and conditions under which grouting will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

- 1. Place grout as shown and indicated, and in accordance with Laws and Regulations and grout manufacturer's instructions. If manufacturer's instructions conflict with the Contract Documents, obtain clarification or interpretation from Engineer before proceeding.

2. Consistency of non-shrink grouts shall be as required to completely fill the space to be grouted for the particular application. Do not install grout for dry-packing without approval of Engineer. When dry-packing is approved by Engineer, dry-pack consistency shall be such that grout has sufficient water to ensure hydration and grout strength development, and remains plastic, moldable, and that does not flow.
 3. Grouting shall comply with temperature and weather limitations in Section 03 30 00, Cast-In-Place Concrete.
 4. Cure grout in accordance with grout manufacturer's instructions for prepackaged grout and Section 03 30 00, Cast-In-Place Concrete, for grout fill.
- B. Columns and Beams:
1. After shimming columns and beams to proper elevation, securely tighten anchors. Properly form around base plates allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with non-shrink grout.
- C. Equipment Bases:
1. Install equipment in accordance with manufacturer's recommendations, Laws, and Regulations, and the Contract Documents. After shimming equipment to proper elevation, securely tighten anchors. Properly form around base plates, allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of equipment base and top of concrete base to ensure that voids are completely filled with non-shrink grout.
- D. Handrail Posts:
1. After posts have been properly inserted into holes or sleeves, fill annular space between posts and sleeve with non-shrink grout. Bevel grout at juncture with post so that water will flow away from post.
- E. Construction Joints:
1. Place a six-inch minimum thick layer of construction joint grout over contact surface of concrete at interface of horizontal construction joints in accordance with Section 03 15 00, Concrete Accessories, and Section 03 30 00, Cast-In-Place Concrete.
- F. Grout Fill:
1. All mechanical, electrical, and finish work shall be completed prior to placing grout fill. Base slab shall be provided with a scratched finish in accordance with Section 03 30 00, Cast-In-Place Concrete. Roughen existing slabs shall by abrasive blasting or hydroblasting exposing aggregates to ensure bonding to base slab.
 2. Minimum thickness of grout fill shall be one-inch. Where finished surface of grout fill is to form an intersecting angle of less than 45 degrees with concrete surface against which grout will be placed, form a key in the concrete surface at the intersection point. Key shall be minimum of 3.5 inches wide by 1.5 inches deep.

3. Thoroughly clean and wet base slab prior to placing grout fill. Do not place grout fill until slab is completely free of standing water. A thin coat of neat Type II cement slurry shall be broomed into surface of slab. Place grout fill while slurry is wet. Grout fill shall be compacted by rolling or tamping, brought to elevation, and floated. In tanks and basins where scraping-type equipment will be installed, grout fill shall be screeded by blades attached to revolving mechanism of equipment in accordance with procedures recommended by equipment manufacturer after grout is brought to elevation.
4. Grout fill placed on sloping slabs shall be installed uniformly from bottom of slab to top, for full width of placement.
5. Test grout fill surface with a straight edge to detect high and low spots; immediately correct high and low spots in grout fill. When grout fill has hardened sufficiently, grout fill shall be steel troweled to provide a smooth surface free of bug holes and other imperfections. While an acceptable type of mechanical trowel may be used in this operation, the last pass over the grout fill surface shall be by hand-troweling. During finishing, do not apply the following to the grout fill surface: water, dry cement, or mixture of dry cement and sand.
6. Cure and protect grout fill in accordance with Section 03 30 00, Cast-In-Place Concrete.

3.3 FIELD QUALITY CONTROL

A. Field Testing Services:

1. Contractor shall employ an independent testing laboratory to perform field quality control testing for grout. Engineer will direct where samples are to be obtained.
2. Contractor shall provide all curing and necessary cube storage as specified in Section 01 45 28, On-Site Facilities for Testing Laboratory.
3. Comply with testing laboratory requirements in Section 03 30 00, Cast-In-Place Concrete for required testing laboratory qualifications.

B. Quality Control Testing During Construction:

1. Grout Fill: Perform sampling and testing for field quality control during grout fill placing as follows:
 - a. Sampling Fresh Grout Fill: ASTM C172.
 - b. Slump: ASTM C143; one test for each load of grout at point of discharge.
 - c. Air Content: ASTM C231; one sample for every two grout loads at point of discharge, and when a change in the grout is observed.
 - e. Compression Test Specimens:
 - 1) In accordance with ASTM C109/C109M; make one set of compression cubes for each 50 cubic yards of grout, or fraction thereof, of each mix design placed each day. Each set shall be four standard cubes, unless otherwise directed by Engineer.
2. Non-shrink Grout: Perform sampling and testing for field quality control during non-shrink grout placing as follows:
 - a. Perform compression testing of non-shrink grout in accordance with ASTM C109/C109M at intervals during construction as selected by

Engineer. Make a set of four specimens for testing compressive strength at a period of time selected by the Engineer.

- b. Perform compression tests on epoxy grout and fabricate specimens for epoxy grout testing in accordance with ASTM C579, Method B, at intervals during construction as selected by the Engineer. Make a set of four specimens for testing compressive strength at a period of time selected by Engineer.

C. Evaluation of Field Quality Control Tests:

1. Do not use grout, delivered to final point of placement, having slump or total air content that does not comply with the Contract Documents.
2. Compressive strength tests for laboratory-cured cubes will be acceptable if averages of all sets of three consecutive compressive strength test results equal or exceed the required 28-day design compressive strength of the associated type of grout.
3. If the compressive strength tests do not comply with the requirements in the Contract Documents, the grout represented by such tests will be considered defective and shall be removed and replaced, or subject to other action required by Engineer, at Contractor's expense.

D. Manufacturer's Services:

1. Manufacturers of proprietary materials shall make available upon 72 hours notification the services of qualified, full time employee, experienced in serving as a field service technician for the products required, to aid in assuring proper use of products under the actual conditions at the Site.

+ + END OF SECTION + +

SECTION 04 00 05

MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide labor, materials, equipment, and incidentals as shown, specified, and required for masonry Work, including:
 - a. Providing openings in unit masonry construction to accommodate the Work under this and other Specification Sections, and building into unit masonry construction all items such as sleeves, anchorage devices, inserts and other items to be embedded in unit masonry construction for which placement is not specifically provided under other Specification Sections.
 - b. Providing openings in unit masonry construction to accommodate the work under other contracts and assisting other contractors in building into unit masonry construction all items such as sleeves, anchorage devices, inserts, and other items required to be embedded in unit masonry construction under other contracts.
2. Extent of each type of unit masonry is shown.
3. Types of products and features required include:
 - a. Insulated and uninsulated concrete unit masonry.
 - b. Masonry mortar and grout.
 - c. Masonry accessories.
 - d. Unit masonry meeting requirements of Special Inspections.

B. Coordination:

1. Review installation procedures under other Specification Sections and coordinate the items that must be installed with unit masonry construction Work.
2. Unit masonry construction done without built-in flashings and other built-in Work shall be removed and rebuilt at no additional cost to OWNER, even if discovered after apparent completion of unit masonry construction.
3. Coordinate Work under other Specification Sections to avoid delay of masonry construction.
4. Notify other contractors in advance of erecting unit masonry construction to provide other contractors with sufficient time to provide items that must be installed with or before masonry construction.

C. Related Sections:

1. Section 07 95 13, Expansion Joint Cover Assemblies.

1.2 REFERENCES

A. Referenced Standards: Standards referenced in this Section are:

1. ACI 530, Building Code Requirements for Masonry Structures.
2. ACI 530.1, Specification for Masonry Structures.
3. ASTM A36, Standard Specification for Carbon Structural Steel.
4. ASTM A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
5. ASTM A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A615, Standard Specification for Deformed and Plain Carbon - Bars for Concrete Reinforcement.
7. ASTM A1008, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
8. ASTM A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Low-Alloy with Improved Formability.
9. ASTM C5, Standard Specification for Quicklime for Structural Purposes.
10. ASTM C33, Standard Specification for Concrete Aggregates.
11. ASTM C67, Standard Test Method for Sampling and Testing Brick and Structural Clay Tile.
12. ASTM C90, Standard Specification for Hollow Load-Bearing Concrete Masonry Units.
13. ASTM C91, Standard Specification for Masonry Cement.
14. ASTM C62, Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)
15. ASTM C129, Standard Specification for Non-loadbearing Concrete Masonry Units
16. ASTM C136, Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates.
17. ASTM C140, Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
18. ASTM C144, Standard Specification for Aggregate for Masonry Mortar.
19. ASTM C150, Standard Specification for Portland Cement.
20. ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
21. ASTM C 216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
22. ASTM C270, Standard Specification for Mortar for Unit Masonry.
23. ASTM C331, Standard Specification for Lightweight Aggregates for Concrete Masonry Units.
24. ASTM C387, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
25. ASTM C404, Standard Specification for Aggregates for Masonry Grouts.
26. ASTM C426, Standard Test Method for Linear Drying Shrinkage of Concrete Block.
27. ASTM C 652, Standard Specification for Hollow Brick (Hollow Masonry

Units Made From Clay or Shale).

28. ASTM C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
29. ASTM C1019, Standard Test Method for Sampling and Testing Grout.
30. ASTM C1093, Practice for Accreditation of Testing Agencies for Unit Masonry.
31. ASTM C1314, Standard Test Method for Compressive Strength of Masonry Prisms.
32. ASTM D2240, Standard Test Method for Rubber Property- Durometer Hardness.
33. ASTM D2287, Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
34. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
35. ASTM E119, Standard Test Method for Fire Tests of Building Construction and Materials.
36. BIA, Technical Notes on Brick and Tile Construction.
37. BIA, Technical Bulletin 1A, Construction and Protection Recommendations for Cold Weather Masonry Construction.
38. BIA, Technical Notes on Cleaning Clay Products Masonry.
39. NCMA, Guide Specifications and Technical Bulletins.
40. UL 901, Specification for Quicklime for Structural Purposes.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer: Hire a single installer regularly engaged in preformed unit masonry installation and with successful and documented experience in erecting unit masonry of scope and type of Work required; and employs only tradesmen with specific skill and successful experience in this type of Work. Submit name and qualifications to ENGINEER with the following information for at least three successful, completed projects:
 - a. Names and telephone numbers of owners, architects or engineers responsible for project.
 - b. Approximate contract cost of unit masonry for which installer was responsible.
 - c. Amount (square feet) of unit masonry installed.
2. Laboratory Qualifications:
 - a. Testing Laboratory: In accordance with ASTM C1093.

B. Component Supply and Compatibility:

1. Obtain each type of concrete masonry unit from one Supplier, cured by one process and of uniform texture and color, or in an established uniform blend thereof.
2. Do not change source or brands of mortar products during the Project.

3. Where question of compliance to requirements of this Section arise, mortar properties Specification will take precedence over mortar proportion Specification.
4. Do not change proportions established for mortar accepted under property Specifications, and do not use products with different physical characteristics in mortar used in the Work, unless compliance with requirements of property Specifications is re-established by submitting acceptable data to ENGINEER.
5. Do not combine two air-entraining materials in mortar.

C. Job Mock-up:

1. Prior to installing unit masonry and after ENGINEER's approval of Samples, erect job mock-ups using products, pattern bond, and joint tooling shown or specified. Build mock-up at the Site, at a location approved by the ENGINEER, of full required wall thickness. Mock-up shall be approximately 4.0 feet by 3.33 feet unless another size or location is shown as job mock-up. Provide special features as directed, including finished opening 16 inches by 16 inches, finished end, and masonry control joint. Indicate proposed range of color, texture and workmanship to be expected in completed Work. Obtain ENGINEER's approval of visual qualities of mock-up before starting unit masonry construction. Retain and protect mock-up during construction as a standard for judging unit masonry Work. Do not alter, move, or destroy mock-up until receiving written permission by ENGINEER.
2. Build as many mock-up panels as required to obtain ENGINEER's approval.
3. Perform unit masonry construction tests per ACI 530.1. Provide to ENGINEER acceptable test results before starting masonry construction.
4. Masonry construction that does not meet standards approved on mock-up panel shall be removed and rebuilt to conform to the Contract Documents. Provide mock-up panel for the following:
 - a. Typical complete exterior wall including anchors, and masonry wall ties and all other components of complete exterior wall system.

D. Masonry Pre-installation Conference:

1. Prior to starting unit masonry construction Work, schedule and hold masonry pre-installation conference at the Site, to review foreseeable methods and procedures related to unit masonry Work including:
 - a. Project requirements per the Contract Documents.
 - b. Structural concept.
 - c. Sequence of masonry construction.
 - d. Special masonry details.
 - e. Required submittals.
 - f. Standard of workmanship.
 - g. Prism tests or mortar, grout sample and unit masonry tests results.
 - h. Quality control requirements.
 - i. Job organization and availability of products, tradesmen, equipment, and facilities needed to conform to Progress Schedule.
 - j. Masonry control and expansion joint location and materials.
 - k. Modular planning requirements.

- l. Weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
- m. Required special inspection, testing, and certifying procedures.
- n. Compliance with building codes and other Laws and Regulations.
2. Attendance is mandatory for the following:
 - a. CONTRACTOR's Site superintendent.
 - b. Masonry Subcontractor's Site superintendent.
 - c. Masonry Subcontractor's foreman.
 - d. Authorized representative of unit masonry Suppliers.
 - e. ENGINEER.
 - f. Special Inspection Coordinator.
3. If additional information must be developed to adequately cover agenda items, reconvene conference as soon as possible.
4. CONTRACTOR shall record discussions of conference and decisions and agreements (or disagreements) and provide copy of record to each conference attendee.

1.4 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Submit the following:
 - a. Complete layout of all masonry walls showing modular planning and all special shapes to be used in the Work. Show details for each condition encountered in the Work. Provide plan and elevation views drawn at a scale of 1/4-inch equal to 1.0 foot, and details drawn at a scale of 1.5-inch equal to 1.0 foot. Show all items included in unit masonry construction.
 - b. Shop Drawings showing location, extent and accurate configuration and profile of all items shown, specified, and required by this and other Specification Sections included in unit masonry construction.
 - c. Shop Drawing for fabrication, bending, and placement of reinforcing bars. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabricating and placing reinforcing for unit masonry Work.
 - d. Job Mock-up: Shop Drawings showing location, extent, and accurate configuration of all items to be built into the mock-up. Provide elevations drawn at scale of 1.5 inch equal to 1.0 foot.
2. Product Data: Submit the following:
 - a. Copies of manufacturer's specifications and test data for each type of concrete masonry unit specified, including certification that concrete masonry unit complies with Contract Documents. Include instructions for handling, storage, installation, and protection of each type of concrete masonry unit.
3. Samples: Submit the following:
 - a. Color Sample board, for each type of unit masonry specified, showing standard and custom colors.

- b. Each type of unit masonry specified in colors selected by ENGINEER. Select each type of unit masonry to show range of color and texture that can be expected in the Work.
- c. ENGINEER's review will be for color and texture only.

B. Informational Submittals:

- 1. Source Quality Control Submittals: Submit the following:
 - a. Pre-construction laboratory test results, in accordance with ASTM C140.
- 2. Test and Evaluation Reports
 - a. Preconstruction testing results as specified in Paragraph 3.1.B of this Section.
- 3. Qualification Statements:
 - a. Testing laboratory.
 - b. Installer.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling of Products:

- 1. Comply with Section 01 65 00, Product Delivery Requirements.

B. Storage of Materials:

- 1. Comply with 01 66 00, Product Storage and Handling Requirements.
- 2. Maintain temperatures under cover so that masonry products are above 20 degrees F during installation.

1.6 JOB CONDITIONS

A. Temporary Facilities: Provide supplemental heat sources and equipment as required should CONTRACTOR desire to continue unit masonry Work in cold weather. Pay for fuel for supplemental heat.

B. Environmental Requirements:

- 1. Do not perform unit masonry Work when air temperature is below 28 degrees F on a rising temperature, or below 36 degrees F on falling temperatures without providing temporary, heated enclosures, or without providing temporary heating or other precautions to prevent freezing.
- 2. Do not use frozen products, and do not build upon frozen unit masonry Work.
- 3. Remove and replace all unit masonry Work damaged by cold.

C. Protection:

- 1. Protect unit masonry Work against freezing for at least 48 hours after being placed.
 - a. For Mean Daily Air Temperatures of 40 degrees F to 32 degrees F: Protect unit masonry construction from precipitation for 48 hours after installation.

- b. For Mean Daily Air Temperatures of 32 degrees F to 25 degrees F: Completely cover unit masonry construction for 48 hours after installation.
 - c. For Mean Daily Temperatures of 25 degrees F to 20 degrees F: Completely cover unit masonry construction with insulating blankets for 48 hours after installation of the masonry.
 - d. For Mean Daily Air Temperatures of 20 degrees F and Below: Maintain unit masonry construction above 32 degrees F for 48 hours by enclosure and supplementary heating.
 - 2. When Work is not in progress, protect partially completed unit masonry construction against rapid heat loss and from water entering the masonry by covering the top of walls with a strong, waterproof, non-staining membrane. Extend the membrane at least two feet down both sides of wall and secure in place using wall cover clamps spaced at intervals of four feet and at each end, and at joints in membrane.
- D. Cold Weather Unit Masonry Construction:
- 1. Mortar used in unit masonry construction when mean daily temperature is below 40 degrees F shall be Portland cement-lime-sand mortar using high early strength Portland cement.
 - 2. Clay or shale unit masonry with suction in excess of 20 grams of water per 30 square inches per minute shall be sprinkled with heated water just prior to installation. Provide water temperature above 70 degrees F when temperature of masonry units is above 32 degrees F. Water temperature shall be above 120 degrees F when temperature of masonry units is below 32 degrees F.
 - 3. For Air Temperatures of 40 degrees F to 32 degrees F: Heat sand or mixing water to a minimum of 70 degrees F and maximum of 160 degrees F.
 - 4. For Air Temperatures of 32 degrees F to 25 degrees F: Heat sand and mixing water to a minimum of 70 degrees F and maximum of 160 degrees F.
 - 5. For Air Temperatures of 25 degrees F to 20 degrees F: Heat sand and mixing water to a minimum of 70 degrees F and maximum of 160 degrees F. Provide heat on both sides of the wall under construction. Employ wind breaks when wind is in excess of 15 mph.
 - 6. For Air Temperatures of 20 degrees F and Below: Heat sand and mixing water to minimum of 70 degrees F and maximum of 160 degrees F. Provide enclosure and auxiliary heat to maintain air temperature above 32 degrees F in the work area. Temperature of masonry units when laid shall not be less than 20 degrees F.
- E. Hot Weather Unit Masonry Work: Protect unit masonry Work by methods acceptable to ENGINEER from direct exposure to wind and sun when surrounding air temperature is 99 degrees F in the shade with relative humidity less than 50 percent.

PART 2 - PRODUCTS

2.1 MORTAR MATERIALS

- A. Portland Cement: Provide the following for Portland cement-lime mortars:
 - 1. ASTM C150, Type I.
 - 2. Use ASTM C150, Type III high-early strength, for laying masonry when air temperature is less than 50 degrees F.
 - 3. Provide nonstaining Portland cement of natural color.
- B. Masonry Cement: Provide the following for masonry cement mortars:
 - 1. ASTM C91 Type S, proportioned to comply with ASTM C270.
 - 2. Maximum Air Content, ASTM C91: 19 percent.
 - 3. Non-staining.
- C. Hydrated Lime: ASTM C207 Type S, or lime putty ASTM C5.
- D. Sand Aggregates:
 - 1. ASTM C144, except for joints less than 1/4-inch, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 2. White Mortar Aggregates: Provide natural white sand or ground white stone for Portland cement-lime mortars.
 - 3. Colored Mortar Aggregates: Provide ground marble, granite, or other sound stone as required to match the sample approved by ENGINEER for Portland cement-lime mortars.
 - 4. Fine Aggregate for Grout: Sand, ASTM C404, Size No. 1.
 - 5. Coarse Aggregate for Grout: ASTM C404, Size No. 8 or Size No. 89.
- E. Ready-mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified for mortar materials, combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C270 and C387.
- F. Water: Free from injurious amounts of oils, acids, alkalis, or organic matter, and clean, fresh, and potable.

2.2 MORTAR MIXES

- A. General:
 - 1. Anti-freeze Admixture or Agents: Not allowed.
 - 2. Calcium Chloride: Not allowed.
- B. Mortar for Unit Masonry: Comply with ASTM C270, Table 2, except limit materials to those specified in this Section, do not substitute ASTM C91 masonry cement for ASTM C150 Portland cement without a submittal approval by ENGINEER, and limit cement to lime ratio by volume as follows:
 - 1. Type M:
 - a. Provide following proportions by volume:

- 1) Portland Cement: One part.
- 2) Hydrated Lime or Lime Putty: 1/4 part.
- 3) Aggregate Ratio (measured in damp loose condition): Not less than 2-1/4 and not more than three times sum of volumes of cementitious materials.
- b. Properties:
 - 1) Average Compressive Strength, ASTM C270: 2,500 psi.
 - 2) Minimum Water Retention, ASTM C270: 75 percent.
 - 3) Maximum Air Content, ASTM C270: 12 percent.
- C. Grout: Self consolidating grout shall comply with ASTM C476 with max aggregate size of 3/8 inch and minimum compressive strength of 3000 psi grout. Tests shall be in accordance with ACI 530.
 1. Coarse Grout:
 - a. Provide the following proportions by volume:
 - 1) Portland Cement: One part.
 - 2) Hydrated Lime or Lime Putty: Zero to 1/10 part.
 - 3) Fine Aggregate Ratio (Measured in a Damp Loose Condition): Sand shall be not less than 2.25 times and not more than three times sum of volumes of cement and lime.
 - 4) Coarse Aggregate Ratio: Not less than one and not more than two times sum of volumes of cement and lime.
 - b. Mix grout to have slump of ten inches plus or minus one-inch, at placement.

2.3 CONCRETE MASONRY UNITS

- A. General: Concrete masonry units shall comply with requirements below.
- B. Hollow and Solid Load-bearing Concrete Masonry Units: ASTM C90, with minimum of 15 percent coal fly ash and 50 percent recycle aggregate as part of concrete mix. Normal weight, Grade N, Type 1 conforming to C90 and have a minimum compressive strength of 2000 psi on the net area.
- C. Hollow Non-load-bearing Concrete Masonry Units: ASTM C129 with minimum of 15 percent coal fly ash and 50 percent recycle aggregate as part of the concrete mix.
- D. Weight:
 1. Provide normal weight ground face High-R units using concrete aggregates complying with ASTM C33 producing dry net weight of not less than 125 pounds per cubic foot.
- E. Size: Manufacturer's standard units with nominal face dimensions of 16 inches long by eight inches high by nominal width dimension shown on Drawings (15-5/8-inches by 7-5/8-inches actual).
- F. Special Shapes: Provide the following:

1. Lintels, bond beams, reinforcing units, and flush-end reinforcing units, interior and exterior corner shapes, solid jambs, sash block, coves, pre-molded control joint blocks, headers, and other special conditions.
 2. Bullnose units for outside vertical corners including doors, windows, louvers and other openings, unless specifically shown by note indicating that this feature is not required.
 3. End blocks at all locations where masonry walls abut concrete, or steel columns to facilitate installation of compressible filler, backer rod and sealant or fire-rated fire stop sealant systems, if required.
- G. Waterproofing Admixture: Manufacture all types of concrete unit masonry, used in construction of exterior walls (including interior wythe of cavity walls) with an integral waterproofing admixture as follows:
1. Material: Cross-linking acrylic polymer.
 2. Proportion: In strict accordance with manufacturer's instructions.
 3. Products and Manufacturers: Provide products of one of the following:
 - a. Dry-Block System by Forrer Industries, a Unit of W. R. Grace & Company Construction Products Division.
 - b. Eucon Blocktite by Euclid Chemical Company.
 - c. Or equal.
- H. Exposed Faces: Provide manufacturer's standard and custom colors and textures as specified for type of concrete masonry unit.
- I. Provide two-core concrete masonry units.
- J. Provide exterior concrete masonry units with polystyrene foam insulation core inserts. Coordinate with Section 07 21 05, Building Insulation.
- K. Provide concrete masonry units meeting requirements of the Special Inspections.

2.4 INSULATED, FILLED GROUND FACE, CONCRETE MASONRY UNITS

- A. In addition to requirements applicable to all concrete masonry units, comply with this Article for insulated, filled ground-face, concrete masonry units.
- B. Products and Manufacturers: Provide one of the following:
1. Korfil Hi-R H insulated, filled ground-face concrete masonry units, by Concrete Products Group.
 2. Hi-R-H pre-insulated, filled ground-face concrete masonry units, by Johnson Concrete Products.
 3. Hi-R insulated, filled ground-face concrete masonry units, by York Building Products.
 4. Or equal.
- C. Insulated, Filled Ground-Face, Concrete Masonry Units: Provide face of units filled with cementitious grout with minimum cured strength and durability equal to

concrete masonry units. After polishing, filled surface shall have factory-applied heat treated acrylic coating conforming with ASTM C744 relative to adhesion, abrasion, color change, and resistance to fading. Provide the following:

1. ASTM C90 compliant.
2. Facing Components, ASTM C744.
3. Freeze/Thaw Durability, ASTM C1262: No separation, spalling, cracking, or disintegration of facing.
4. Insulation for cavity: Extruded-Polystyrene Board Insulation – ASTM 578, closed-cell product extruded with an integral skin.
 - a. Type IV 2-1/8-inch thickness, R-12.

D. Color and Score Pattern: Provide the following:

1. Manufacturer's complete selection of all regionally available colors for final selection by ENGINEER. ENGINEER will select a maximum of two colors for the Work.
2. Color, surface texture, and aggregate uniform within normal range established by Sample approved by ENGINEER.

2.5 FILLED GROUND FACE CONCRETE MASONRY UNITS

A. In addition to requirements applicable to all concrete masonry units, comply with this Article for filled ground-face concrete masonry units.

B. Products and Manufacturers: Provide one of the following:

1. Filled ground-face concrete masonry units, by Concrete Products Group.
2. Filled ground-face concrete masonry units, by Johnson Concrete Products.
3. Filled ground-face concrete masonry units, by York Building Products.
4. Or equal.

C. Filled Ground-Face Concrete Masonry Units: Provide face of units filled with cementitious grout with minimum cured strength and durability equal to concrete masonry units. After polishing, filled surface shall have factory-applied heat treated acrylic coating conforming with ASTM C744 relative to adhesion, abrasion, color change, and resistance to fading. Provide the following:

1. ASTM C90 compliant.
2. Facing Components, ASTM C744.
3. Freeze/Thaw Durability, ASTM C1262: No separation, spalling, cracking, or disintegration of facing.

D. Color and Score Pattern: Provide the following:

1. Manufacturer's complete selection of all regionally available colors for final selection by ENGINEER. ENGINEER will select a maximum of two colors for the Work.
2. Color, surface texture, and aggregate uniform within normal range established by Sample approved by ENGINEER.

2.6 MASONRY ACCESSORIES

- A. Continuous Horizontal Wire Reinforcing and Ties for Masonry: Provide the following unless otherwise shown:
1. General: Welded wire units prefabricated in straight lengths of not less than ten feet, with matching corner “L” and intersection “T” units. Fabricate from cold-drawn steel wire complying with ASTM A82, with deformed continuous 3/16-inch gage side rods and plain 9 gage cross rods, crimped for cavity wall construction, with unit width of 1.5 to two inches less than thickness of wall or partition. All reinforcing and ties shall be hot dipped galvanized after fabrication with 1.5 ounces per square foot of zinc coating complying with ASTM A153, Class B-2, unless otherwise specified.
 2. For single-wythe masonry, use units fabricated as follows:
 - a. Ladder-type fabricated with one horizontal rod beneath each unit masonry shell wall spaced not more than 16 inches on centers.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Ladder Mesh Reinforcement with #220 Ladder-Mesh, by Hohmann & Barnard, Inc.
 - 2) Series 200 Ladder 2 Wire, by Wire Bond.
 - 3) Or equal.
- B. Anchoring Devices for Masonry: Provide the following, unless otherwise shown:
1. General: Provide the following:
 - a. Cold rolled steel sheet complying with ASTM A1008, hot-rolled steel sheet and strip complying with ASTM A1011, plates and bars complying with ASTM A36 and cold drawn steel wire complying with ASTM A82, all hot-dipped galvanized after fabrication with 1.5 ounces per square foot of zinc coating complying with ASTM A153.
 - b. Rectangular, corrugated, one-inch wide ties, fabricated of 12-gage sheet metal, unless otherwise specified.
 - c. Size tie lengths to extend to within one-inch of outside face of outer wythe face shell of opposite face of masonry or to maximum depth of 12 inches and between 1.5 inches to two inches less than width of masonry abutting webs and to a maximum depth of 12 inches abutting flanges of structural supports. Provide wire crimped with a vee-drip for use in cavity wall construction.
 - d. Flexible Anchors: When masonry abuts structural walls or framework provide flexible anchors that allow horizontal and vertical movement of masonry, but provide lateral restraint.
 2. Anchorage to Steel Columns and Steel Beam Webs: Provide the following for lateral restraint of unit masonry walls at structural steel framework:
 - a. Weld-on, 12-gage, 3/4-inch wide by seven-inch long anchor straps providing four inches of vertical adjustment, welded to steel structure.
 - b. Products and Manufacturers: Provide products of one of the following:
 - 1) Byna-Tie - Flexible Anchors/Seismicclip/Continuous Wire, No. 301W - Column Web Ties and No.359F Series - Anchor Straps by Hohmann & Barnard, Inc.

- 2) No. 370 Seismic Hook, No. 318 Triangle Ties, Custom No. 315 Weld-On Strap by Heckmann Building Products.
 - 3) Or equal.
- 3. Compressible Filler: Provide watertight joint filler where unit masonry construction abuts structural framework members, or as shown. Provide the following:
 - a. Polyurethane foam strip saturated with polybutylene waterproofing material which, when installed at a compression ratio of two-to-one, is impermeable to water.
 - b. Resilient to -40 degrees F with 100 percent movement recovery.
 - c. Elongation of 140 percent with a tensile strength of not less than 53 pounds per square inch.
- C. Miscellaneous Masonry Accessories: Provide the following, where shown:
 - 1. Reinforcing Bars:
 - a. Deformed carbon steel, ASTM A615, Grade 60 for bars No. 3 to No. 18 except as otherwise shown.
 - 2. Rebar Positioners: Provide the following:
 - a. Nine-gage reinforcing bar positioners that accommodate both horizontal and vertical reinforcing steel.
 - b. Fabricate units as required for the Work.
 - c. Products and Manufacturers: Provide products of one of the following:
 - 1) #RB Series and #RB-Twin Series Rebar Positioners by Hohmann & Barnard, Inc
 - 2) Rebar Positioners by Heckmann Building Products.
 - 3) Or equal.
 - 3. Masonry Control Joint Components: Provide the following:
 - a. Pre-molded Control Joint Strips: Provide complete selection of solid extruded rubber and PVC strips with a Shore A durometer hardness of 80 to 90 complying with ASTM D2240 and D2287, designed to fit standard sash block and maintain lateral stability in masonry wall. Size and configuration shall be as shown.
 - 1) Products and Manufacturers: Provide products of one of the following:
 - a) #RS8 - Control Joints by Hohmann & Barnard, Inc.
 - b) #352-12 Control Joints by Heckmann Building Products.
 - c) Or equal.
 - 4. Expansion Joint Components:
 - a. Exterior Wall Expansion Joint Cover Assemblies, refer to Section 07 95 13, Expansion Joint Cover Assemblies.

2.7 SOURCE QUALITY CONTROL

- A. Allowable Tolerances: For concrete masonry units provide the following:
 - 1. Face Dimension: Total variation in finished and installed face dimensions of units shall not exceed 1/16-inch between largest and smallest units in each lot of units of each size.

2. Distortion: Distortion of plane and edges of face of individual units, as installed, from corresponding plane surface and edges of prefaced concrete masonry unit, shall not exceed 1/16-inch.
3. Top and Bottom Surfaces: Ground to provide finish height of 7-5/8 inches plus or minus 1/16-inch.

PART 3 - EXECUTION

3.1 INSPECTION

- A. CONTRACTOR and installer shall examine areas and conditions under which unit masonry construction Work will be installed, and notify ENGINEER of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.
- B. Preconstruction Testing: Testing agency shall perform tests prior to installation of unit masonry. Special inspections testing procedures are specified in the referenced standards and the Contract Documents.
 1. Mortar Test: For each mix required, per ASTM C780.
 2. Grout Test: For each mix required, per ASTM C1019 and ACI 530.1.
 3. Prism Test: For each type of construction required, per ASTM C 1314 and ACI 530.1.
 4. Compressive strength of completed concrete unit masonry walls shall not be less than 1,500 psi as determined by methods specified in ACI 530.1.

3.2 PREPARATION

- A. Measurement of Mortar Materials:
 1. Cement and Hydrated Lime: Batched by the bag.
 2. Sand: Batched by volume in suitably calibrated containers, provided proper allowance is made for bulking and consolidation and for weight per cubic foot, of contained moisture.
 3. Proportion of Volumetric Mixtures: One 94-pound sack of Portland cement and one 50-pound sack of hydrated lime constitute nominal one cubic foot.
 4. Shovel measurement: Not allowed.
- B. Mortar Mixing:
 1. Type of Mixer: Machine mix in approved mixer in which quantity of water is accurately and uniformly controlled.
 2. While mixer is in operation add approximately three-quarters of required water, half the sand, all the cement, then add remainder of sand.
 3. Allow batch to mix briefly then add water in small quantities until satisfactory workability is obtained.
 4. Mix for at least five minutes after all materials have been added.
 5. Hydrated Lime for Mortar Requiring Lime Content: Use dry-mix method. Turn over materials for each batch together until even color of mixed, dry

materials indicates that cementitious material has been thoroughly distributed throughout mass, then add water to obtain required plasticity.

6. Lime putty, if approved for use, shall be prepared in accordance with ASTM C5.
7. Mixer drum shall be completely emptied before recharging next batch.
8. Re-tempering of mortar is not allowed.

C. Wetting of Masonry Units:

1. Use wetting methods that ensure that each masonry unit is nearly saturated but surface-dry when laid.
2. Concrete Masonry Units: Except for absorbent units specified to be wetted, lay masonry units dry. Do not wet concrete masonry units.

D. Cleaning Reinforcement: Before being placed, remove loose rust, mill scale, earth, ice, and other coatings except galvanizing from reinforcement. Do not use reinforcing bars with kinks or bends not shown on Drawings or approved Shop Drawings, or bars with reduced cross-section.

3.3 INSTALLATION, GENERAL

- A. Thickness: Build walls, floors and other unit masonry construction work to thickness shown. Build single-wythe walls to actual thickness of masonry units using units of nominal thickness shown or specified.
- B. Build chases and recesses as shown or required by others. Provide at least eight inches of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
- C. Leave openings for equipment, piping, ducts, and other items to be installed subsequent to start of masonry Work. After installing said items, complete unit masonry Work to match Work immediately adjacent to openings.
- D. Cut masonry units using wet cutting, motor driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining Work neatly. Use full size units without cutting wherever possible.

3.4 LAYING MASONRY WALLS

A. General:

1. Mortar Types: Unless otherwise indicated, use mortar as specified and as follows:
 - a. For all Work, use Type M or S mortar.
 - b. Use coarse grout fill for structural requirements and for grouting reinforcing steel in unit masonry construction Work.
 - c. Do not use mortar that has begun to set or if more than 30 minutes have elapsed since initial mixing. Re-temper mortar during the 30-minute period only as required to restore workability.

2. Lay out walls in advance for accurate spacing of surface pattern bond with uniform joint widths and to properly locate openings, masonry control joints, returns, and offsets. Avoid using less than half-size units at corners, jambs, and where possible at other locations.
 3. Lay up walls plumb and true to comply with specified tolerances, with courses level, accurately spaced, and coordinated with other Work.
 4. Pattern Bond Unit Masonry:
 - a. Lay all unit masonry Work visible in the finished Work in running bond with vertical joints in each course centered on units in courses above and below. Avoid using less than full-size units.
 - b. Bond and interlock each course of each wythe at corners.
 - c. Do not use units with less than eight-inch horizontal face dimensions at corners or jambs.
 - d. Interlock alternate courses at corners.
 5. Color of Concrete Unit Masonry:
 - a. Lay all concrete unit masonry of colors as shown.
- B. Construction Tolerances:
1. Variation from Plumb: For lines and surfaces of columns, walls and arises, do not exceed 1/4-inch in 10 feet, or 3/8-inch in a story height (20 feet maximum), nor two-inch in 40 feet or more. Except for external corners, expansion joints and other conspicuous lines, do not exceed 1/4-inch in any story or 20 feet maximum, nor two-inch in 40 feet or more.
 2. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4-inch in any bay or 20 feet maximum, nor 3/4-inch in 40 feet or more.
 3. Variation of Linear Building Line: For position shown and related portion of columns, walls and partitions, do not exceed two-inch in any bay or 20 feet maximum, nor 3/4-inch in 40 feet or more.
 4. Variation in Cross-sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4-inch nor plus two-inch.
- C. Mortar Bedding and Jointing:
1. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.
 2. Lay hollow masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.
 - a. Maintain joint widths shown, except for minor variations required to maintain pattern bond alignment. Lay walls with 3/8-inch joints.
 3. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials, except paint, unless otherwise shown.
 4. Tool exposed joints, when mortar is "thumbprint" hard, slightly concave. Rake out mortar in preparation for application of calking or sealants where required.
 5. Concave-tool exterior joints below grade.

6. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
- D. Stopping and Resuming Work: Rake back half-unit masonry length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly, if required, and remove loose masonry units and mortar prior to laying new masonry.
- E. Built-in Work:
1. As the Work progresses, build in items shown, specified or required by others. Fill cores in one block width solidly with masonry around built-in items.
 2. Where built-in items are to be embedded in cores of hollow masonry units, place layer of cavity fill mesh in joint below and rod mortar or grout into core.
- F. Horizontal Joint Reinforcing:
1. Provide continuous horizontal joint reinforcing as specified. Fully embed longitudinal side rods in mortar for their entire length with minimum cover of 5/8-inch on exterior side of walls and 1/2-inch at other locations. Lap reinforcement minimum of six inches at ends of units. Do not bridge masonry control joints with reinforcing.
 2. Reinforce all masonry walls with continuous horizontal joint reinforcing unless specifically noted or specified to be omitted.
 3. Provide continuity at corners and wall intersections by use of prefabricated “L” and “T” sections. Cut and bend units in accordance with manufacturer’s written instructions.
 4. Space continuous horizontal reinforcing as follows:
 - a. Space reinforcing at 16 inches on centers vertically, unless otherwise shown.
 5. Reinforce masonry openings greater than 12 inches wide, with horizontal joint reinforcing placed in two horizontal joints approximately eight inches apart, immediately above lintel and immediately below sill. Extend reinforcing minimum of 2.0 feet beyond jambs of opening.
 6. In addition to wall reinforcing, provide additional reinforcing at openings as required to comply with the Contract Documents.
- G. Structural Bonding of Multi-wythe Masonry:
1. Use continuous reinforcing embedded in horizontal mortar joints for bond tie between wythes as specified in this Section.
 2. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
 - a. For horizontally reinforced masonry, provide continuity at corners with prefabricated “L” units as specified in this Section, in addition to masonry bonding.
 3. Intersecting and Abutting Walls: Unless vertical expansion or masonry control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

- a. Provide masonry bond in alternate courses.
 - b. Provide individual metal ties at not more than 2.0 feet on centers vertically, unless shown at closer spacing.
 - c. Provide continuity with horizontal joint reinforcing using prefabricated “T” and “L” units.
- H. Structural Reinforced Unit Masonry Construction:
 - 1. Comply with the requirements of ACI 530.1 and applicable codes.
- I. Grouting Structural Reinforced Unit Masonry Construction:
 - 1. Comply with requirements of ACI 530.1 and applicable codes.
- J. Anchoring Masonry Work:
 - 1. Provide anchoring devices of type specified. If not shown or specified, provide standard type for facing and back up involved in compliance with requirements of Laws and Regulations.
 - 2. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
 - a. Provide an open space not less than 1/2-inch or more than one-inch in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar and other rigid materials.
 - b. Anchor masonry to cast-in-place concrete and structural steel members using continuous wire ties embedded in mortar and snap-locked into seismic clips and with triangular ties fitted with flexible dovetails for anchorage to cast-in-place concrete.
 - c. Space anchors as shown, but not more than 2.0 feet on center vertically and 3.0 feet on center horizontally.
 - d. Provide end blocks where masonry abuts structural support to facilitate installation of compressible filler, firesafing insulation, backer rod, and sealant.
 - 3. Anchor single wythe masonry veneer to backing with metal ties as follows:
 - a. Anchor veneer to structural members with metal anchors embedded in masonry joints and attached to structure. Provide anchors with flexible tie section, unless otherwise shown.
 - b. Anchor veneer to concrete and structural steel members using continuous wire ties embedded in mortar and snap-locked into seismic clips with triangular ties, fitted with flexible dovetails for anchorage to cast-in-place concrete, snap-locked to seismic clip and attached to structural supports using anchors specified.
 - c. Space anchors as shown, but not more than 2.0 feet on center vertically and 3.0 feet on center horizontally.
- K. Masonry Control and Expansion Joints:
 - 1. Provide vertical control and expansion joints in masonry where shown. Build in related items as unit masonry Work progresses. Rake out mortar in preparation for application of compressible filler, calking and sealants.

2. Masonry Control and Expansion Joints Items: Build in sash block and premolded control joint strips as the Work progresses.
- L. Lintels and Bond Beams:
1. Provide masonry lintels and bond beams where openings of 16 inches or more are shown. Provide formed in place masonry lintels and bond beams. Temporarily support formed-in-place lintels and bond beams.
 - a. Unless otherwise shown, provide one horizontal number six deformed reinforcing bar for each 4 inches of wall thickness.
 - b. For hollow masonry unit walls, use specially formed “U”-shaped lintel and bond beam units with reinforcing bars placed as shown, filled with coarse grout as specified.
 2. Provide minimum bearing at each jamb of eight inches for all openings.
 3. On concrete unit masonry walls where pattern bond remains visually exposed, increase minimum bearing of masonry lintels to maintain joint pattern of wall and install to be indistinguishable from surrounding masonry.
- M. Flashing of Masonry Work:
1. Refer to Section 13 34 19, Pre-Engineered Metal Building, for type of flashing required. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Seal flashing penetrations with mastic. Extend flashing at tops of masonry walls and turn down.
 - a. Extend flashings beyond edge of lintels and sills at least 4 inches and turn up edge on sides, to form pan (end dam), to direct moisture to exterior.
 - b. Interlock end joints of deformed metal flashings by overlapping deformations not less than 1.5 inches and seal lap with elastic sealant.
 - c. Seal joints in through wall metal flashing watertight.
 - d. Install flashings in accordance with manufacturer’s instructions.
 2. Install reglets and nailers for flashing and other related work where shown to be built into unit masonry construction Work.

3.5 REPAIR, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent Work to provide neat, uniform appearance, properly prepared for application of sealant compounds.
- C. Cleaning Exposed, Unglazed Masonry Surfaces:
1. Final Cleaning: After mortar is thoroughly set and cured, clean sample wall area of approximately 20 square feet as described below. Obtain

ENGINEER's acceptance of sample cleaning before proceeding to clean remainder of masonry Work.

- a. Dry-clean to remove large particles of mortar using wood paddles and scrapers. Use chisel or wire brush if required.
 - b. Presoak wall by saturating with water and flush off loose mortar and dirt.
 - c. Comply with requirements and recommendations for "Cleaning Clay Products Masonry" of Technical Notes on Brick and Tile Construction by Brick Industry Association for type of masonry and conditions involved in the Work.
 - d. Apply cleaners per manufacturer's instructions.
 - e. Protect other Work from cleaning solutions and cleaning operations.
2. Do not use acid cleaning agent, abrasive tools or powders, or metal cleaning tools or wire brushes, unless specifically recommended in writing by manufacturer.

D. Protection:

1. Protect unit masonry construction Work from deterioration, discoloration or damage during subsequent construction operations.

3.6 FIELD QUALITY CONTROL

- A. OWNER shall hire independent testing laboratory acceptable to OWNER and ENGINEER to take samples and conduct tests to evaluate air entrainment, water retention, and compliance of products with Contract Documents, and to determine compressive strength of mortar and grout. Conduct tests in accordance with ASTM C91. Provide tests results to ENGINEER prior to commencement of Work.
- B. After initial test, ENGINEER will require maximum of five additional tests to be conducted at his discretion.
- C. Test and inspect all load-bearing concrete unit masonry during construction, meeting the requirements of Level 3 Quality Assurance as defined by ACI 530.1.
- D. Masonry walls that do not meet requirements of Special Inspections shall be repaired in manner acceptable to ENGINEER at no expense to OWNER.

+ + END OF SECTION + +

SECTION 05 05 33

ANCHOR SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. Contractor shall provide all professional services, labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install anchor systems.
 - 2. This Section includes all anchor systems required for the Work, but not specified under other Sections.
- B. Coordination:
 - 1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before anchor systems Work.
 - 2.

1.2 REFERENCES

- A. Standards referenced in this Section are:
 - 1. ACI 318, Building Code Requirements for Structural Concrete.
 - 2. ACI 350, Code Requirements for Environmental Engineering Concrete Structures.
 - 3. ACI 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.
 - 4. ANSI B212.15, Cutting Tools - Carbide-tipped Masonry Drills And Blanks For Carbide-tipped Masonry Drills.
 - 5. ANSI/MSS SP-58, Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.
 - 6. ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 7. ASTM A276, Specification for Stainless Steel Bars and Shapes.
 - 8. ASTM A493, Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.
 - 9. ASTM A563, Specification for Carbon and Alloy Steel Nuts.
 - 10. ASTM A1011/A1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - 11. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 12. ASTM C307, Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.

13. ASTM C881/C881M, Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
14. ASTM D695, Test Method for Compressive Properties of Rigid Plastics.
15. ASTM D790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
16. ASTM E329, Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
17. ASTM E488, Test Methods for Strength of Anchors in Concrete and Masonry Elements.
18. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
19. ASTM F594, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
20. ASTM F1554, Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength.
21. FS A-A-1922A, Shield, Expansion (Caulking Anchors, Single Lead).
22. FS A-A-1923A, Concrete Expansion Anchors.
23. FS A-A-1925A, Shield, Expansion (Nail Anchors).
24. FS A-A-55614, Shield, Expansion (non-drilling expansion anchors).
25. ICC-ES AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.
26. ICC-ES AC58, Acceptance Criteria for Adhesive Anchors in Masonry Elements.
27. ICC-ES AC60, Acceptance Criteria for Anchors in Unreinforced Masonry Elements.
28. ICC-ES AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
29. ICC-ES AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
30. ISO 3506-1, Mechanical Properties of Corrosion-Resistant Stainless Steel Fasteners -- Part 1: Bolts, Screws and Studs.
31. NSF/ANSI 61, Drinking Water System Components – Health Effects.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory: Shall comply with ASTM E329 and shall be experienced in tension testing of post-installed anchoring systems.
2. Professional Engineer:
 - a. Contractor or delegated system manufacturer shall retain a registered professional engineer legally qualified to practice in the same state as the Site.
 - b. Responsibilities include:
 - 1) Reviewing anchor system performance and design criteria stated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to Engineer by

- Contractor.
- 3) Preparing or supervising preparation of design calculations and related Shop Drawings.
 - 4) Signing and sealing all design calculations and Shop Drawings.
 - 5) Certifying that:
 - a) Design of anchor systems has been performed in accordance with performance and design criteria stated in the Contract Documents, and
 - b) Design conforms to all applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice.
3. Post-installed Anchor Installer:
- a. Mechanical and Adhesive anchors, except as noted in 1.3.A.4.b: Installer shall be experienced and trained by post-installed anchor system manufacturer in proper installation of manufacturer's products. Product installation training by distributors or manufacturer's representatives is unacceptable unless the person furnishing the training is qualified as a trainer by the anchor manufacturer.
 - b. Adhesive Anchors: Installation of horizontal or vertically inclined adhesive anchors shall be performed by personnel certified under an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchors Installer Certification Program, or equivalent. Description of equivalent programs shall be submitted for Engineer's approval and acceptance by the building official having jurisdiction.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Listing of all anchor systems products intended for use in the Work including product type, intended location in the Project, and embedded lengths.
 2. Product Data:
 - a. Manufacturer's specifications, load tables, dimension diagrams, acceptable base material conditions, acceptable drilling methods, and acceptable bored hole conditions.
 - b. Copies of valid ICC ES reports that presents load-carrying capacities and installation requirements for anchor systems.
- B. Delegated Design Submittals:
1. Design Data: Submit the following:
 - a. Design Calculations for delegated anchor systems. Structural calculations shall include all specified performance criteria. The magnitude of delegated system/anchorage reactions to supporting structure shall be clearly noted. Design calculations shall be signed, sealed and dated by Contractor's professional engineer.

- C. Informational Submittals: Submit the following:
1. Certificates:
 - a. For each type of anchor bolt or threaded rod, submit copies of laboratory test reports and other data required to demonstrate compliance with the Contract Documents.
 - b. Post-installed anchor system manufacturer's certification that installer received training in the proper installation of manufacturer's products required for the Work.
 - c. For each required adhesive anchor installer, submit ACI/CRSI Adhesive Anchor Installer Certification.
 2. Manufacturer's Instructions:
 - a. Installation instructions for each anchor system product proposed for use, including bore hole cleaning procedures and adhesive injection, cure and gel time tables, and temperature ranges (storage, installation and in-service).

1.5 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection:
1. Keep materials dry during delivery and storage.
 2. Store adhesive materials within manufacturer's recommended storage temperature range.
 3. Protect anchor systems from damage at the Site. Protect products from corrosion and deterioration.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. General:
1. At locations where conditions dictate that Work specified in other Sections is to be of corrosion resistant materials, provide associated anchor systems of stainless steel materials, unless other corrosion-resistant anchor system material is specified. Provide anchor systems of stainless steel materials where stainless steel materials are required in the Contract Documents.
 2. Stainless Steel Nuts:
 - a. For anchor bolts and adhesive anchors, provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts for stainless steel anchors used for anchoring equipment, gates, and weirs, and other locations, if any, where the attachment will require future removal for operation or maintenance. Provide lock washer or double nuts on each anchorage device provided for equipment, as required by equipment manufacturer.
 - b. For other locations, provide for each anchorage device a nut as specified or as required by anchor manufacturer. When ASTM A194/A194M, Grade 8S (Nitronic 60) nuts are not required for anchor

bolts and adhesive anchors as specified in this Section, provide anti-seizing compound where stainless steel rods are used with stainless steel nuts of the same type.

3. Materials that can contact potable water or water that will be treated to become potable shall be listed in NSF/ANSI 61.

B. Design Criteria

1. Size, Length, and Load-carrying Capacity: Comply with the Contract Documents. When size, length or load-carrying capacity of anchor system is not otherwise shown or indicated, provide the following:
 - a. Anchor Bolts: Provide size, length, and capacity required to carry design load based on values and requirements of Paragraph 3.2.A of this Section. For conditions outside limits of critical edge distance and spacing in Paragraph 3.2.A of this Section, minimum anchor bolt embedment as shown or indicated in Paragraph 3.2.A of this Section apply and capacity shall be based on requirements of Laws and Regulations, including applicable building codes.
 - b. Adhesive Anchors, Expansion Anchors, or Concrete Inserts: Provide size, length, type, and capacity required to carry design load. Anchor capacity shall be based on the procedures required by the building code in effect at the Site. Where Evaluation Service Reports issued by the ICC Evaluation Service are required in this Section, anchor capacities shall be based on design procedure required in the applicable ICC Evaluation Service Report.
 - 1) General: Determine capacity considering reductions due to installation and inspection procedures, embedment length, strength of base fastening materials, spacing, and edge distance, as indicated in the manufacturer's design guidelines. For capacity determination, concrete shall be assumed to be in the cracked condition, unless calculations demonstrate that the anchor system will be installed in an area that is not expected to crack under any and all conditions of design loading.
 - 2) Concrete Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum embedment depth of the greater of the following: required to develop tensile strength of anchor, or a minimum embedment of 10 anchor diameters; and minimum anchor spacing and edge distance of 12 anchor diameters.
 - 3) Concrete Masonry Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum anchor spacing and edge distance as indicated in anchor manufacturer's instructions.
 - 4) Concrete Expansion Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum embedment depth of six anchor diameters, and minimum anchor spacing and edge distance of seven anchor diameters.

- 5) Concrete Masonry Expansion Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum anchor spacing and edge distance as indicated in anchor manufacturer's instructions.
 - 6) Concrete Undercut Anchors: Unless otherwise shown or indicated in the Contract Documents, or approved by Engineer, provide minimum anchor spacing and edge distance as tabulated in anchor manufacturer's instructions.
2. Delegated Design: When anchor systems are used for supporting materials, equipment, or systems delegated to Contractor, Subcontractor, or Supplier, provide anchor system suitable for loads indicated in delegated design documents and consistent with the design intent expressed in the Contract Documents. Anchor system shall be designed by a professional engineer, retained by Contractor, Subcontractor, or Supplier, registered in the same state as the Site, with proper consideration of concrete strength, spacing and edge distance
- a. Design Loads. Comply with the Contract Documents. When design load of supported material, equipment, or system is not otherwise shown or indicated, provide the following:
 - 1) Equipment Anchors: Use design load recommended by equipment manufacturer. When equipment can be filled with fluid, use loads that incorporate equipment load and load imposed by fluid.
 - 2) Pipe Hangers and Supports: Use full weight of pipe, and fluid contained in pipe that are tributary to the support plus the full weight of valves and accessories located between the hanger or support being anchored and the next hanger or support.
 - 3) Hangers and Supports for Electrical Systems, and HVAC, Plumbing, and Fire Suppression Systems and Piping: Use the full weight of supported system that is tributary to the support plus the full weight of accessories located between the hanger or support being anchored and the next hanger or support. When piping or equipment is to be filled with fluid, anchor systems shall be sized to support such loads in addition to the weight of the equipment, piping, or system, as applicable.

C. Application:

1. Anchor Bolts:
 - a. Where anchor bolt is shown or indicated, use cast-in-place anchor bolt unless another anchor type is approved by Engineer.
 - b. Provide anchor bolts as shown or indicated, or as required to secure structural element to appropriate anchor surface.
2. Concrete Adhesive Anchors:
 - a. Use where adhesive anchors are shown or indicated for installation in concrete.
 - b. Suitable for use where subject to vibration.
 - c. Suitable for use in exterior locations or locations subject to freezing.

- d. Suitable for use in submerged, intermittently submerged, or buried locations.
 - e. Do not use in overhead applications, unless otherwise shown or approved by Engineer.
 - f. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.
3. Concrete Masonry Adhesive Anchors:
- a. Use where adhesive anchors are shown or indicated for installation in grout-filled or hollow masonry units.
 - b. Suitable for use where subject to vibration.
 - c. Suitable for use in exterior locations or locations subject to freezing.
 - d. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.
4. Concrete Wedge Expansion Anchors:
- a. Use where expansion anchors are shown or indicated for installation in concrete.
 - b. Do not use where subject to vibration.
 - c. Do not use in exterior locations or locations subject to freezing.
 - d. Do not use in submerged, intermittently submerged, or buried locations.
 - e. Suitable for use in overhead applications.
5. Grout-filled Concrete Masonry Wedge Expansion Anchors:
- a. Use where expansion anchors are shown or indicated for installation on the interior face of grout-filled unit masonry.
 - b. Do not use where subject to vibration.
 - c. Do not use in exterior locations or locations subject to freezing.
6. Hollow Concrete Masonry Sleeve Expansion Anchors:
- a. Use where expansion anchors are shown or indicated for installation in hollow concrete unit masonry or solid brick.
 - b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
 - c. Do not use where subject to vibration.
 - d. Do not use in exterior locations or locations subject to freezing.
7. Drop-in Expansion Anchors:
- a. Use drop-in expansion anchors installed in concrete where light-duty anchors are required to support piping or conduit two-inch diameter or smaller.
 - b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
 - c. Do not use where subject to vibration.
 - d. Do not use at submerged, intermittently submerged, or buried locations.
 - e. Do not use in exterior locations or locations subject to freezing.
 - f. Suitable for use in overhead applications.
8. Concrete Undercut Anchors:

- a. Use where undercut anchors are shown or indicated for installation in concrete.
 - b. Suitable for use where subject to vibration.
 - c. Do not use in submerged, intermittently submerged, or buried locations.
 - d. Do not use in exterior locations or locations subject to freezing.
 - e. Suitable for use in overhead applications.
9. Concrete Inserts:
- a. Use only where shown or indicated in the Contract Documents.
 - b. Allowed for use to support pipe hangers and pipe supports for pipe size and loading recommended by the concrete insert manufacturer.
10. Drive-In Expansion Anchors:
- a. Use drive-in expansion anchors installed in concrete, precast concrete, grouted masonry units, or brick, where light-duty anchors are required to support piping or conduit one-inch diameter and smaller.
 - b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
 - c. Do not use in overhead applications.
11. For Use in Precast Concrete Planks:
- a. To support piping or conduit two-inch diameter and smaller, use low-profile drop-in anchors, hollow concrete masonry adhesive anchors, or through-bolts.
 - b. For piping greater than two-inch diameter, or to support safety-related systems, use through-bolts. Each through-bolt shall consist of threaded rod, nuts, washers, and bearing plate.

2.2 MATERIALS

A. Anchor Bolts:

- 1. Interior Dry Non-corrosive Locations: Provide straight threaded carbon steel rods complying with ASTM F1554, Grade (36), with heavy hex nuts complying with ASTM A563 Grade (A), unless otherwise shown or indicated on the Drawings. Hooked anchor bolts are unacceptable.
- 2. Exterior, Buried, Submerged Locations, or When Exposed to Wastewater: Provide stainless steel straight threaded rods complying with ASTM F593, AISI Type 316, Condition A, with ASTM F594, AISI Type 316, stainless steel nuts. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required. Other AISI types may be used when approved by Engineer. Hooked bolts are unacceptable.
- 3. Equipment: Provide anchor bolts complying with material requirements of this Section and equipment manufacturer's requirements relative to size, embedment length, and anchor bolt projection. Anchor bolts shall be straight threaded rods with washers and nuts as specified in this Section. Hooked bolts are unacceptable.

4. Anchoring of Structural Elements: Provide anchor bolts of size, material, and strength shown or indicated in the Contract Documents.
- B. Concrete Adhesive Anchors:
1. General:
 - a. Adhesive anchors shall consist of threaded rods anchored into hardened concrete using an adhesive system.
 2. Products and Manufacturers: Provide one of the following:
 - a. HIT-RE 500-V3 Injection Epoxy Adhesive Anchoring System, by Hilti Fastening Systems, Inc.
 - b. HIT-HY 200-A and HIT-HY 200-R Adhesive Anchoring System, by Hilti Fastening Systems, Inc
 - c. SET-XP Adhesive anchoring system, by Simpson Strong-Tie Company, Inc.
 - d. Or equal.
 3. Adhesive:
 - a. Adhesive system shall use two-component adhesive mix.
 - b. Adhesives shall have a current evaluation report by ICC Evaluation Service for use in both cracked and uncracked concrete with seismic recognition for SDC A through F as tested and assessed in accordance with ICC-ES AC308, which incorporates the requirements of ACI 355.4-11
 - d. Adhesives shall have minimum bond strength and minimum design bond strength in accordance with Table 05 05 33-A:

TABLE 05 05 33-A:
ADHESIVE BOND STRENGTH ^{1,2}

Bond Strength (psi)					
Rod Diameter	Uncracked Concrete	Cracked Concrete	Dowel Size	Uncracked Concrete	Cracked Concrete
1/2-inch	1670	880	#4	1500	1080
5/8-inch	1670	750	#5	1460	1090
3/4-inch	1670	665	#6	1415	1015
7/8-inch	1525	610	#7	1370	835
1-inch	1360	595	#8	1330	760
-	-	-	#9	1560	850
1.25-inch	1070	595	#10	1240	475

Table Notes:

1. Bond strengths listed for hammer-drilled, dry hole.
 2. Bond strengths listed for maximum short term concrete temperature of 130 degrees F and maximum long term concrete temperature of 110 degrees F.
4. Anchor:
 - a. Provide continuously-threaded, AISI Type 316 stainless steel adhesive anchor rod. Threaded rods shall comply with the concrete adhesive anchor manufacturer's specifications as included in the ICC Service Evaluation Report for the anchor submitted. Nuts shall have specified proof load stresses equal to or greater than the minimum tensile

strength of the stainless steel threaded rod used. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required.

C. Concrete Masonry Adhesive Anchors:

1. General:
 - a. Grout-filled concrete masonry adhesive anchors shall consist of threaded rods anchored into grout-filled concrete block masonry using an adhesive system.
 - b. Hollow concrete masonry adhesive anchors shall consist of threaded rods with a cylindrical mesh steel or plastic screen tube anchored into hollow concrete block masonry using an adhesive system.
2. Products and Manufacturers: Provide one of the following:
 - a. HIT-HY 70 Masonry Adhesive Anchor System with HAS-E continuously threaded rod or continuously deformed steel bar, by Hilti Fastening Systems, Inc.
 - b. Acrylic-Tie Adhesive, by Simpson Strong-Tie Company, Inc.
 - c. Or equal.
3. Adhesive:
 - a. Adhesive system shall use two-component adhesive mix.
 - b. Adhesives shall have current ICC Evaluation Service Report for use in grout-filled concrete masonry, tested and assessed in accordance with ICC-ES AC 58 and ICC-ES AC 60.
4. Anchor:
 - a. Provide stainless steel adhesive anchor rod complying with ASTM F593, AISI Type 316, Condition CW, with ASTM F594, AISI Type 316 stainless steel nuts. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required.
5. Mesh Screen Tube (for hollow masonry applications):
 - a. Provide with mesh size, length, and diameter as specified by adhesive anchor manufacturer.

D. Concrete Wedge Expansion Anchors:

1. General:
 - a. Concrete wedge expansion anchors shall consist of stud, wedge, nut, and washer.
2. Products and Manufacturers: Provide one of the following:
 - a. Kwik Bolt TZ Wedge Anchor, by Hilti Fastening Systems, Inc.
 - b. Strong Bolt 2 Wedge Anchor, by Simpson Strong-Tie Company, Inc.
 - c. Or equal.
3. Anchors shall comply with physical requirements of FS A-A-1923A, Type 4. Provide concrete wedge expansion anchors suitable for use in cracked and uncracked concrete in accordance with ACI 318 Chapter 17 and ACI 350, Appendix D. Demonstrate suitability of cracked concrete wedge anchors in accordance with ACI 355.2 prequalification tests.

4. Interior Dry Non-corrosive Locations: Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633.
 5. Other Locations: Provide expansion anchors complete with nuts and washers, AISI Type 316 stainless steel anchor body, in accordance with ASTM A276 or ASTM A493.
 7. Concrete wedge expansion anchors shall have a current ICC Evaluation Service Report for use in both cracked and uncracked concrete with seismic recognition in seismic design Categories A through F when tested and assessed in accordance with ICC-ES AC193.
- E. Concrete Inserts:
1. Manufacturers: Provide products of one of the following:
 - a. Unistrut Corporation.
 - b. Cooper B-Line, Inc.
 - c. Anvil International, Inc.
 - d. Or equal.
 2. Spot Concrete Inserts:
 - a. Provide inserts recommended by insert manufacturer for required loading. Inserts shall comply with ANSI/MSS SP-58, malleable iron, Type 18. Spot inserts shall allow for lateral adjustment and have means for attachment to forms. Provide nuts compatible with insert and to suit threaded hanger rod sizes.
 3. Continuous Concrete Inserts:
 - a. Provide inserts recommended by insert manufacturer for required loading. Inserts shall be continuous type and shall be manufactured from minimum 12-gage cold-formed channel sections, complying with ASTM A1011/A1011M, stainless steel, Grade 33, complete with styrofoam inserts, end caps, and means for attaching to forms. Provide channel nuts compatible with insert suitable for threaded hanger rod sizes.
 4. Provide inserts with plain finish.
- F. Drive-In Expansion Anchors:
1. General:
 - a. Drive-In expansion anchors shall each consist of stainless steel drive pin and expanding alloy body.
 2. Products and Manufacturers: Provide one of the following:
 - a. Metal HIT Anchor, by Hilti Fastening Systems, Inc.
 - b. Zinc Nailon Anchor, by Simpson Strong-Tie Company, Inc.
 - c. Or equal.
 3. Provide Type 304 stainless steel drive pin with zinc alloy body. Anchor shall comply with physical requirements of FS A-A-1925A, Type 1.
- G. Unless approved by Engineer, do not use power-actuated fasteners or other types of bolts and fasteners not specified in this Section.

- H. Anti-Seizing Compound:
1. Products and Manufacturers: Provide one of the following:
 - a. Pure Nickel Never-Seez, by Bostik.
 - b. Nickel-Graf, by Anti-Seize Technology.
 - c. Or equal.
 2. Provide pure nickel anti-seizing compound.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which materials will be installed and advise Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Anchor Bolts:
1. Provide anchor bolts as shown or indicated in the Contract Documents, or as required to secure structural element to the appropriate anchor surface.
 2. Locate and accurately set anchor bolts using templates or other devices as required, prior to placing concrete. Wet setting of anchor bolts is unacceptable.
 3. Protect threads and shank from damage during installation and subsequent construction operations.
 4. Unless otherwise shown or approved by Engineer anchor bolts shall comply with Table 05 05 33-B:

**TABLE 05 05 33-B:
SINGLE ANCHOR BOLT ALLOWABLE LOADS ON ANCHOR BOLTS ¹**

Bolt Diameter (inch)	F1554 Grade 36				F1554			
	F593 Type 316, Condition A				Grade 55			
	Minimum Embedment (inch)	Minimum Edge Distance and Spacing ² (inch)	Shear ^{3,4} (lb)	Tension ³ (lb)	Minimum Embedment (inch)	Minimum Edge Distance and Spacing ² (inch)	Shear ³ (lb)	Tension ³ (lb)
1/2	6	9	1,262	2,420	8.5	12.75	1,660	3,190
5/8	7.5	11.25	2,010	3,860	10.5	15.75	2,640	5,080
3/4	9	13.5	2,974	5,720	13	19.5	3,910	7,520
7/8	10.5	15.75	4,106	7,890	15	22.5	5,400	10,390
1	12	18	5,386	10,360	17	25.5	7,090	13,450
1 1/8	13.5	20.25	6,787	13,052	19	28.5	8,930	16,580
1 1/4	15	22.5	8,617	16,572	21	31.5	11,340	20,040

- B. Adhesive Anchors, Undercut Anchors, and Expansion Anchors – General:
- Prior to drilling, locate existing reinforcing steel in vicinity of proposed holes. If reinforcing conflicts with proposed hole location, obtain Engineer's approval of alternate hole locations to avoid drilling through or damaging existing reinforcing bars.
- C. Adhesive Anchors:
- Installation conditions shall comply with all requirements of the approved product Evaluation Service Report (ESR), including "Conditions of Use." Comply with manufacturer's written installation instructions and the following.
 - Drill holes to adhesive system manufacturer's recommended drill bit diameter to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits that comply with the tolerances of ANSI B212.15. Core-drilled holes are unacceptable.
 - Before setting adhesive anchor, hole shall be made free of dust and debris by method recommended by adhesive anchor system manufacturer. Hole shall be brushed with adhesive system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.
 - Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.
 - Prior to injecting adhesive into the drilled hole, dispense, to a location appropriate for such waste, an initial amount of adhesive from the mixing nozzle, until adhesive is uniform color.
 - Inject adhesive into hole through injection system-mixing nozzle and necessary extension tubes, placed to bottom of hole. Discharge end shall be withdrawn as adhesive is placed but kept immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled

from hole during anchor placement.

7. Twist anchors during insertion into partially-filled hole to guarantee full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.
8. Provide adequate curing in accordance with adhesive system manufacturer's requirements prior to continuing with adjoining Work that could place load on installed adhesive anchors. Do not begin adjoining Work until adhesive anchors are successfully tested or when allowed by Engineer.
9. Limitations:
 - a. Core drilled holes shall not be allowed.
 - b. At time of anchor installation, concrete shall have compressive strength (f'_c) of not less than 3,000 psi.
 - b. At time of anchor installation, concrete shall have age of not less than 21 days.
 - c. Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such as heated enclosures, necessary to ensure that base material temperature complies with anchor systems manufacturer's requirements during installation and curing of adhesive anchor system.
 - d. Oversized Holes: Advise Engineer immediately if size of drilled hole is larger than recommended by anchor system manufacturer. Cost of corrective measures, including but not limited to redesign of anchors due to decreased anchor capacities, shall be paid by Contractor.
 - e. Embedment depths shall be based on installation in normal-weight concrete with compressive strength of 3,000 psi when embedded in existing concrete, and 4,000 psi when embedded in new concrete.
 - f. Obstructions in drill path: When existing reinforcing steel is encountered during drilling, stop and do not damage existing reinforcing. Obtain Engineer's approval for any required modifications.

D. Expansion Anchors:

1. Comply with expansion anchor manufacturer's written installation instructions and the following:
2. Drill holes using anchor system manufacturer's recommended drill bit diameter and to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits complying with tolerances of ANSI B212.15. Core drilled holes are unacceptable.
3. Before installing anchor, hole shall be made free of dust and debris by method recommended by anchor system manufacturer. Hole shall be brushed with anchor system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles.
4. Before installing anchor, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.

5. Protect threads from damage during anchor installation. Drive anchors not less than four threads below surface of the attachment. Set anchors to anchor manufacturer's recommended torque using a torque wrench.
 6. Limitations:
 - a. At time of anchor installation, concrete shall have age of not less than 21 days.
 - b. At time of anchor loading, concrete shall have attained full specified compressive strength (f'_c).
- E. Concrete Undercut Anchors:
1. Comply with undercut anchor manufacturer's written installation instructions and the following.
 2. Protect threads from damage during anchor installation.
 3. Drill hole to anchor manufacturer's specified depth and diameter using a drill bit matched to the specific anchor.
 4. Before setting the undercut anchor, hole shall be free of dust and debris using method recommended by undercut anchor system manufacturer. Hole shall be blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles.
 5. Insert the anchor by hand until anchor reaches bottom of hole.
 6. Set anchor in accordance with manufacturer's instructions using anchor manufacturer's specified setting tool.
 7. Verify that the setting mark is visible on the threaded rod above the sleeve.
 8. Anchor shall be set to manufacturer's recommended torque, using a torque wrench.
 9. Limitations:
 - a. At time of anchor installation, concrete shall have age of not less than 7 days.
 - b. At time of anchor loading, concrete shall have attained full specified compressive strength (f'_c).
- F. Concrete Inserts:
1. Comply with concrete insert manufacturer's installation instructions.
 2. Inserts shall be flush with slab bottom surface.
 3. Protect embedded items from damage during concrete placing. Ensure that embedded items are securely fastened to prevent movement during concrete placing, and ensure that embedded items do fill with concrete during concrete placing.
 4. Inserts intended for piping greater than four-inch diameter shall be provided with hooked rods attached to concrete reinforcing.
- G. Anti-Seizing Compound:
1. Provide anti-seizing compound in accordance with anti-seizing compound manufacturer's installation instructions, at locations indicated in Paragraph 2.1.B of this Section.

2. Do not use anti-seizing compound at locations where anchor bolt or adhesive anchor will contact potable water or water that will be treated to become potable.

3.3 CLEANING

- A. After embedding concrete is placed, remove protection and clean bolts and inserts.

3.4 FIELD QUALITY CONTROL

- A. Site Tests:
 1. Furnish services of independent testing laboratory to perform field quality tensile testing of production adhesive anchors at the Site, unless otherwise specified.
 - a. Testing shall comply with ASTM E488.
 - b. Test at least ten percent of all types of adhesive anchors. If one or more adhesive anchors fail the test, Contractor shall pay cost of testing all anchors of the same type installed in the Work. Contractor shall be responsible for retesting costs.
 - c. Engineer will direct which adhesive anchors are to be tested and indicate test load to be used.
 - d. Apply test loads with hydraulic ram.
 - e. Displacement of post-installed anchors shall not exceed $D/10$, where D is nominal diameter of anchor being tested.
 2. Mechanical Anchors:
 - a. Responsibility:
 - 1) Furnish services of independent testing laboratory to perform field quality control tensile testing of mechanical anchors at the Site.
 - 2) Contractor shall demonstrate competence in installing mechanical anchors by performing field quality control tests.
 - b. Perform field quality control tests on test anchors at location directed by Engineer. Test anchors shall not be part of the finished Work.
 - c. Test not less than one installation of each type of mechanical anchor used in the Work.
 - 1) Load each test anchor to failure.
 - 2) Testing shall comply with ASTM E488.
 - 3) Apply test loads with hydraulic ram.
 - d. Anchors that fail to reach the specified test load shall be considered as not passing the test and shall be re-tested at no additional cost to Owner.
 - e. Testing agency shall submit test results to Contractor and Engineer within 24 hours of completion of test.
 3. Correct defective Work by removing and replacing or correcting, as directed by Engineer.
 4. Contractor shall pay for all corrections and subsequent testing required to confirm competence in the installation of post-installed mechanical anchors.

5. Testing agency shall submit test results to Contractor and Engineer within 24 hours of completion of test.
- B. Manufacturer's Services:
1. Provide at the Site services of qualified adhesive manufacturer's representative during initial installation of adhesive anchor systems to train Contractor's personnel in proper installation procedures. Manufacturer's representative shall observe to confirm that installer demonstrates proper installation procedures for adhesive anchors and adhesive material.

+ + END OF SECTION + +

SECTION 05 50 13

MISCELLANEOUS METAL FABRICATIONS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish miscellaneous metal fabrications including surface preparation and shop priming.
2. The Work also includes:
 - a. Providing openings in miscellaneous metal fabrications to accommodate the Work under this and other Sections, and attaching to miscellaneous metal fabrications all items such as sleeves, bands, studs, fasteners, and all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the Work to be installed with, or attached to miscellaneous metal fabrications Work.
3. Hot-dip Galvanizing: Coordinate with steel fabricator detailing for and fabrication of assemblies to be hot-dip galvanized, to minimize distortion during galvanizing process.

C. Related Sections:

1. Section 03 60 00, Grouting.
2. Section 05 05 33, Anchor Systems.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ANSI A14.3, Ladders – Fixed –Safety Requirements.
2. ANSI Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components.
3. ASTM A36/A36M, Specification for Carbon Structural Steel.
4. ASTM A53/A53M, Specification for Pipe Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
5. ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

7. ASTM A240/A240M, Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
8. ASTM A320/A320M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service.
9. ASTM A384/A384M-02 Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
10. ASTM A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
11. ASTM A536, Standard for Ductile Iron Castings.
12. ASTM A572/A572M, Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
13. ASTM A793, Specification for Rolled Floor Plate, Stainless Steel.
14. ASTM A992/A992M, Specification for Structural Steel Shapes.
15. ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
16. ASTM B211, Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.
17. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
18. ASTM B308/B308M, Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
19. ASTM B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
20. ASTM B632/B632M, Specification for Aluminum-Alloy Rolled Tread Plate.
21. AWS D1.1/D1.1M, Structural Welding Code – Steel.
22. AWS D1.2/D1.2M, Structural Welding Code – Aluminum.
23. AWS D1.6, Structural Welding Code – Stainless Steel.
24. NAAMM, Metal Finishes Manual.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Welding:

- a. Qualify welding processes and welding operators in accordance with AWS D1.1/D1.1M, D1.2/D1.2M, or D1.6, as applicable.
- b. When requested by Engineer, provide certification that each welder employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within previous 12 months. Ensure that all certifications are current.

B. Regulatory Requirements: Conform to the following:

1. 29 CFR 1910, Occupational Health and Safety Standards.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Fabrication and erection details for assemblies of miscellaneous metal Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Include setting drawings and templates for locating and installing miscellaneous metal items and anchorage devices.
 - 2. Product Data:
 - a. Copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions for products to be used in miscellaneous metal Work.
- B. Informational Submittals: Submit the following:
- 1. Test and Evaluation Reports:
 - a. Mill test report that indicate chemical and physical properties of each type of material, when requested by Engineer.
 - 2. Qualifications Statements:
 - a. Copies of welder's certifications, when requested by Engineer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
- 1. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in other construction in ample time to prevent delaying the Work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Steel:
- 1. W-Shapes and WT-Shapes: ASTM A992/A992M.
 - 2. S-Shapes and Channels: ASTM A572/A572M, Grade 50.
 - 3. Hollow Structural Sections: ASTM A500, Grade B.
 - 4. Angles, Plates, Bars: ASTM A36/A36M.
 - 5. Steel Pipe: ASTM A53/A53M, Grade B.
- B. Aluminum:
- 1. Aluminum Shapes: ASTM B308/B308M, Alloy 6061-T6, ASTM B 221, Alloy 6061-T6.
 - 2. Aluminum Tubes and Pipes: ASTM B429, Alloy 6061-T6.
 - 3. Aluminum Bars and Rod: ASTM B211, Alloy 6061-T6.
 - 4. Aluminum Plates: ASTM B209, Alloy 6061-T6.
- C. Ductile Iron:
- 1. Castings: ASTM A536.

2.2 MISCELLANEOUS METAL ITEMS

A. Shop Assembly:

1. Pre-assemble items in the shop to the greatest extent possible to minimize field-splicing and field-assembly of units at the Site. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Steel Lintels:

1. Provide loose structural steel lintels for openings and recesses in masonry walls and brick walls as specified or as shown.
2. Weld adjoining members together to form a single unit, where shown or indicated.
3. Provide not less than eight inches bearing at each side of openings, unless otherwise shown.
4. Steel lintels to be installed in exterior walls shall be hot-dip galvanized and finish painted. Other steel lintels shall be painted.
5. Surface preparation and painting shall conform to Section 09 91 00, Painting.
6. Where lintels are not shown on the Drawings, provide lintels as specified in the following table. Provide other lintels where shown and of size indicated on the Drawings.

Clear Span (Max)	Exterior Angle	Interior Angles (typical 8-inch wall)
4.0 feet	3.5 inches by 3.5 inches by 5/16 inches	Two 3.5 inches by 3.5 inches by 5/16 inches
6.0 feet	Four inches by 3.5-inches by 5/16 inches	Two 4 inches by 3.5 inches by 5/16 inches
8.0 feet	Five inches by 3.5 inches by 5/16 inches	Two 5 inches by 3.5 inches by 5/16 inches

C. Shelf Angles:

1. Provide structural steel shelf angles of sizes shown, for attachment to concrete or masonry construction. Provide slotted holes to receive 3/4-inch bolts, spaced not more than six inches from ends and not more than 2.0 feet on centers, unless otherwise shown.
 - a. Provide galvanized shelf angles on outdoor construction.
2. Provide wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.

D. Miscellaneous Framing and Supports:

1. Provide miscellaneous metal framing and supports that are not part of structural steel framework and are required to complete the Work.
2. Fabricate miscellaneous units to sizes, shapes, and profiles shown on the Drawings or, if not shown, of required dimensions to receive adjacent grating, plates, tanks, doors, and other work to be retained by the framing.
3. Except as otherwise shown, fabricate from structural shapes, plates, and bars, of all-welded construction using mitered corners, welded brackets, and splice plates and minimum number of joints for field connection.

4. Cut, drill, and tap units to receive hardware and similar items to be anchored to the Work.
 5. Furnish units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units are to be installed after concrete is placed.
 - a. Except as otherwise shown, space anchors, 2.0 feet on centers, and provide units the equivalent of 1.25-inch by 1/4-inch by eight-inch strips.
 - b. Galvanize exterior miscellaneous frames and supports.
 - c. Where shown or indicated, galvanize miscellaneous frames and supports that are not to be installed outdoors.
 6. Miscellaneous steel framing and supports shall be hot-dip galvanized and finish-painted, unless otherwise shown or indicated.
- E. Fasteners and Hardware: Provide Type 316 stainless steel fasteners for aluminum fabrications and zinc-coated hardware for galvanized fabrications, unless otherwise shown or specified.
- F. Anchors and Expansion Anchors: Refer to Section 05 05 33, Anchor Systems.
- G. Cast Iron Grating:
1. Provide uncoated ductile iron grating conforming to ASTM A 536-84 and manufacturer's standards. Provide grating with a minimum inlet area of 0.65 ft²/Lft.
 2. Products and Manufacturers: Provide products of one of the following:
 - a. Polydrain PDX-12 with 4" End Outlet, by ABT, INC.
 - c. Or equal.
 3. Provide grating with a minimum vertical proof load of 620 psi by utilizing a 6" x 9" centered contact area without failure, load rating Class E.
 4. Provide grates that comply with all the requirements of AASHTO M306.
 5. Finish: Uncoated.

2.3 FINISHING

- A. Surface Preparation and Shop Priming: Perform surface preparation and apply primer coat to miscellaneous metal fabrications in the shop. Conform to surface preparation and shop priming requirements in Section 09 91 00, Painting.
- B. Galvanizing:
1. Galvanizing of fabricated steel items shall comply with ASTM A123/A123M.
 2. Details of fabrication of steel items and assemblies to be hot-dip galvanized shall conform to recommendations of ASTM A384/A384M to minimize the potential for distortion.
- C. Aluminum Finish: Provide natural mill finish for aluminum Work unless otherwise shown or specified.

2.4 SOURCE QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures complying with the Contract Documents.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine conditions under which the Work is to be performed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install miscellaneous metal fabrications accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork where fabrications are to be built into concrete, masonry, or other construction.
- B. Anchor securely as shown and as required for the intended use, using concealed anchors where possible.
- C. Fit exposed connections accurately together to form tight, hairline joints. Field-weld steel connections that are not to be exposed joints and cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1/D1.1M, D1.2/D1.2M and D1.6, as applicable to the material being welded. Grind steel joints smooth and touch-up shop paint coat. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- D. Protection of Aluminum from Dissimilar Materials:
 - 1. Coat surfaces of aluminum that will contact dissimilar materials such as concrete, masonry, and steel, in accordance with Section 09 91 00, Painting.

+ + END OF SECTION + +

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install bituminous dampproofing.
2. Extent of bituminous dampproofing is shown.
3. Types of products required include the following:
 - a. Cold-applied asphalt semi-fibrated, water emulsion, Asbestos-free dampproofing, for exterior structure and wall surfaces above- and below-grade.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before bituminous dampproofing Work.
2. Notify other contractors in advance of installing bituminous dampproofing to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before bituminous dampproofing Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM D1187, Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
2. ASTM D1227, Specification for Emulsified Asphalt Used as Protective Coating for Roofing.
3. ASTM D4479, Specification for Asphalt Roof Coatings—Asbestos-Free.
4. ASTM D4586, Specification for Asphalt Roof Cement, Asbestos-Free.

1.3 QUALITY ASSURANCE

A. Component Supply and Compatibility:

1. Provide all bituminous dampproofing of each type required produced by one manufacturer.

B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Schedule of all Project-specific surfaces where bituminous dampproofing will be applied.
 - 2. Product Data:
 - a. Manufacturer's specifications and technical data for each required dampproofing material. Indicate VOC content of materials proposed.
- B. Informational Submittals: Submit the following:
 - 1. Certificates:
 - a. Submit bituminous dampproofing manufacturer's certification or other data substantiating that materials proposed for use comply with the Contract Documents, and are recommended by bituminous dampproofing manufacturer for the required applications.
 - 2. Supplier's Instructions:
 - a. Manufacturer's instructions for handling and storing.
 - b. Manufacturer's instructions for application methods and application procedures.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Storage of Materials:
 - 1. Store emulsions at temperatures above 40 degrees F.
- B. Handling of Materials:
 - 1. Do not use solvent-based bituminous dampproofing without adequate ventilation. Prevent build-up of explosive and hazardous fumes.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install bituminous dampproofing when ambient air temperature is 40 degrees F or less.
 - 2. Do not apply bituminous dampproofing materials to frozen substrates or to substrate in condition not complying with bituminous dampproofing material manufacturer's recommendations.
 - 3. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Cold-Applied Asphalt Emulsion Dampproofing:
 - 1. Asphalt Emulsion: Manufacturer's standard asphalt and water emulsion, recommended by bituminous dampproofing material manufacturer for below-grade exterior and above-grade interior applications to either damp (green) or dry substrates, compounded to penetrate the substrate and build to a moisture-resistant, breathing-type of elastic coating.
 - 2. VOC Content: Zero 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Semi-Fibrated, Semi-Mastic Emulsion Dampproofing Material:
 - a. Provide semi-fibrated, semi-mastic, emulsion type, brush-applied, dampproofing compound complying with ASTM D1227, Type II, Class I.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Sealmastic Type II by R. W. Meadows, Incorporated.
 - 2) Hydrocide 700B Semimastic, by ChemRex, Inc., Sonneborn Building Products Division.
 - 3) 220 AF Fibered Emulsion Dampproofing, by Karnak Chemical Corporation.
 - 4) Or equal.

2.2 AUXILIARY MATERIALS

- A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- C. Patching Compound: Asbestos-free fibered mastic of type recommended in writing by dampproofing manufacturer.
- D. Board Insulation: Refer to Section 07 21 05.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine the substrates and conditions under which bituminous dampproofing Work will be applied and advise ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. General:

1. Do not proceed with bituminous dampproofing Work until blocking, nailers, piping, conduits, and other projections through the substrate are installed, with substrate properly patched and sealed or flashed to receive the bituminous dampproofing.

B. Surface Preparation:

1. Remove from the substrate dirt, oil, loose materials, and other substances that interfere with penetration, bond, and performance of bituminous dampproofing materials.
2. Dampen with water surfaces that are dry and are to receive application of bituminous dampproofing. Keep such surfaces damp ahead of application.
3. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 INSTALLATION- GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch-wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Concrete Foundations: Apply one trowel coat at not less than 4 gal./100 sq. ft.

B. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft.

3.5 INSTALLATION OF COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Cold-Applied Bituminous Dampproofing Emulsions on Exterior Surfaces:
 - 1. Apply coating of semi-fibrated, semi-mastic, bituminous emulsion dampproofing material by brushing or spraying at the rate of one gallon per 20 square feet to produce uniform dry film thickness of not less than 1/16-inch.
 - 2. Cant Strips, Fillers, and Extension of Coatings:
 - a. On exterior surfaces, where lower edge of dampproofing terminates at a horizontal projection (including footings under walls), provide two-inch by two-inch bituminous grout cant strip.
 - b. Mix sand with required bituminous material to form a plastic grout; form and compact grout in place. Provide bituminous grout fillers where shown and wherever required to close openings in the substrate.
 - c. Extend coatings a distance of 12-inches onto adjoining walls, but do not extend onto surfaces to remain exposed-to-view.

3.6 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

3.7 PROTECTION OF EXECUTED WORK

- A. Protect other work from spillage of bituminous dampproofing materials, and prevent such materials from penetrating and clogging drains, conductors, and other utilities.
- B. Remedy damage to other construction that is soiled or otherwise damaged during installation of bituminous dampproofing.

+ + END OF SECTION + +

SECTION 07 19 16

SILANE WATER REPELLENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install silane water repellents.
2. Extent of surface-applied silane water repellents includes all exterior split-face concrete unit masonry.
3. Types of silane water repellents required include:
 - a. Liquid, colorless, non-gloss-producing, VOC-compliant, applied water repellent.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before silane water repellents Work.
2. Notify other contractors in advance of installing silane water repellents to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before silane water repellents Work.
3. Coordinate water repellent provided with sealant. Water repellent and sealant shall be compatible with each other.

C. Related Sections:

1. Section 04 00 05, Masonry.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
 - a. Water repellent applicator shall be acceptable to or licensed by water repellent manufacturer and shall be regularly engaged in installing water repellent products and work similar to the Work required under this Section.

B. Component Supply and Compatibility:

1. Provide all water repellents of each type required produced by one manufacturer.

C. Regulatory Requirements:

1. VOC emissions from water repellent materials shall not exceed (--1--).

D. Mock-up:

1. Prior to installing materials required under this Section, apply silane water repellent to area acceptable to ENGINEER on mock-up up required under Section 04 00 05, Masonry.
2. Mock-up shall indicate, relative to silane water repellents, proposed range of color change, surface sheen, and workmanship to be expected in the completed Work. Obtain ENGINEER's approval of visual qualities of mock-up before starting unit masonry construction and silane water repellents Work.
3. Provide as many mock-up panels as required to obtain ENGINEER's approval.
4. Water repellent application that does not comply with standards approved on mock-up panels shall be removed and reapplied to comply with the Contract Documents.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
 - a. Manufacturer's literature and specifications on products proposed for use. Indicate VOC emissions of materials.
 - b. Detailed chemical analysis and test results of previously-performed tests of materials required under this Section applied to surfaces identical to, or similar to, those to which silane water repellents will be applied for the Project.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Manufacturer's certification indicating silane water repellent complies with or exceeds requirements of the Contract Documents.
2. Supplier's Instructions:
 - a. Manufacturer's instructions for handling, storing, and shelf-life.
 - b. Manufacturer's instructions for methods and application procedures.
3. Qualifications Statements:
 - a. Installer: Submit copy of manufacturer's acceptance of installer and installer's record of experience in work similar to that required under this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instructions for handling, storing, and shelf-life.

1.5 SITE CONDITIONS

A. Environmental Conditions for Installation:

1. Comply with manufacturer's installation instructions regarding required temperature of surface to which material is applied.
2. Do not apply water repellent when ambient air temperature is lower than 50 degrees F.
3. Do apply materials when ice or frost covers the substrate.

4. Do apply materials when ambient temperature of surface exceeds 100 degrees F.
5. Do apply materials in rainy conditions or when heavy rain is expected with four hours after application.
6. Maintain ambient temperature above 20 degrees F during 24 hours after installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Products and Manufacturers: Provide one of the following:
 1. Prime-A-Pell Plus Series 663, by Tnemec Company, Inc.
 2. SL100 Water Repellent, by PROSOCO, Inc.
 3. Baracade Silane 100C, by Euclid Chemical Company.
 4. Or equal.

2.2 MATERIALS

- A. Chemical Bonding Water Repellents Without Silicone Resin:
 1. Provide silane solution, with or without diffused quartz carbide; colorless, and VOC-compliant.
 2. When dry, water repellent shall be colorless and without gloss.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine under which the Work will be performed. Notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.
- B. Verify that surfaces to receive water-repellent are clean, and free of efflorescence, stains, oil, grease, and other foreign matter detrimental to application.
- C. Verify that required sealants have been installed in areas to receive water repellent.

3.2 PREPARATION

- A. Protection of Adjacent Surfaces:
 1. Protect adjacent surfaces that will not receive silane water repellents. When applied or splashed onto surfaces not required to receive water repellents, remove immediately, using method recommended by water repellent manufacturer. Maintain cleaning materials available at the Site for immediate use.

B. Surface Preparation:

1. Remove loose particles and foreign matter. Remove grease and oil using solvent, effective alkaline cleaner, or detergent as instructed by water repellent manufacturer. Scrub surfaces with water.
2. Surfaces shall be dry prior to applying water repellent.

3.3 APPLICATION

- A. Provide water repellents in accordance with water repellent manufacturer's instructions and recommendations.
- B. Apply in two continuous, uniform coats as recommended by water repellent manufacturer. Allow to dry between coats as recommended by water repellent manufacturer.
- C. Protect materials in vicinity of application. During windy conditions, do not apply water repellent by spraying. When plants and other flora receive water repellent coating, immediately remove water repellent from plants and flora by washing.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. Spray Test: After water repellent has dried, spray with water the surfaces to which water repellent was applied. After surfaces have adequately dried, inspect for signs of water adsorption in presents of ENGINEER, and reapply water repellent to areas that indicate water absorption.

+ + END OF SECTION + +

SECTION 07 21 05

BUILDING INSULATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install building insulation.
2. Extent of each type of building insulation is shown and indicated in the Contract Documents.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before building insulation Work.
2. Notify other contractors in advance of the installation of building insulation to provide them with sufficient time for installing items included in their contracts that must be installed with or before building insulation Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM C177, Test Methods for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. ASTM C203, Test Method for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
3. ASTM C236, Test Methods for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box.
4. ASTM C272, Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
5. ASTM C303, Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
6. ASTM C518, Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
7. ASTM C520, Test Methods for Density of Granular Loose Fill Insulation.
8. ASTM C531, Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars and Monolithic Surfacings.
9. ASTM C549, Specification for Perlite Loose Fill Insulation.
10. ASTM C553, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
11. ASTM C578, Specification for Rigid, Cellular Polystyrene Thermal Insulation.

12. ASTM C612, Specification for Mineral Fiber Block and Board Thermal Insulation.
13. ASTM C665, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
14. ASTM C764, Specification for Mineral Fiber Loose-Fill Thermal Insulation.
15. ASTM D696, Test Method for Coefficient of Linear Thermal Expansion of Plastics between -30 Degrees C and 30 Degrees C with a Vitreous silica dilatometer.
16. ASTM D1621, Test Method for Compressive Properties of Rigid Cellular Plastics.
17. ASTM D2126, Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
18. ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.
19. ASTM E96, Test Methods for Water Vapor Transmission of Materials.
20. ASTM E119, Test Methods for Fire Tests of Building Construction and Materials.
21. UL 1479, Fire Tests of Through-Penetration Firestops.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers:
 - a. Obtain building insulations, requiring blowing agent from manufacturer(s) that manufacture product required using blowing agent acceptable for use after the year 2036 and complying in all respects with Copenhagen Amendments to the Montreal Protocol.
 - b. Manufacturer shall provide complete technical services including preparation and review of Shop Drawings and submittals, installation methods, and proposed detailing for the Work.
2. Installer: Engage single installer for each type of building insulation. Each installer shall be skilled, trained, and have record of successful experience in applying and installing each product, and possess successful record of performing work in accordance with recommendations and requirements of manufacturer or that can submit written evidence of being acceptable to manufacturer for providing the required Work. Installers shall employ only tradesmen with specific skill and successful experience in each type of Work required. Submit to ENGINEER name and qualifications of each installer with the following information for at least three successful, completed projects per installer:
 - a. Names and telephone numbers of owner and architect or engineer responsible for each project.
 - b. Approximate contract cost of the building insulation system installed.
 - c. Quantity (area) of building insulation installed.

B. Regulatory Requirements: Comply with code interpretations by authorities having jurisdiction at the Site.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Drawings showing extent of the building insulation Work and all details required for the Work, referencing system components provided as Samples.
 - 2. Product Data:
 - a. Material specifications and general recommendations from building insulation manufacturer for each type of building insulation product. Include manufacturer's data substantiating that materials comply with Contract Documents.
 - b. Test Reports: Copies of reports of tests on materials being furnished or previously-manufactured, identical materials verifying compliance with physical properties and environmental features specified in the Contract Documents. When requested by ENGINEER, submit qualifications and summary of experience of testing agencies in performing tests similar to those required.
- B. Informational Submittals: Submit the following:
 - 1. Certificates: Certificate from manufacturer stating that manufacturer of foam-type rigid board insulation has used an environmentally safe blowing agent complying with specified requirements.
 - 2. Manufacturer's Instructions: Manufacturer's installation instructions. Indicate by copy of transmittal form that installer has received copy of manufacturer's installation instructions.
 - 3. Site Quality Control Submittals: Submit results of specified Site quality control tests.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Handling of Materials:
 - 1. Do not deliver insulation materials to the Site before the time of installation.
 - 2. Deliver materials in sufficient quantities to allow uninterrupted continuity of the Work.
 - 3. Handle materials carefully to avoid damage and breakage or compressing of boards to less than their specified thickness, or other damage.
 - 4. Handle materials in manner that prevents inclusion of foreign materials.
 - 5. Conform to Section 01 65 00, Product Delivery Requirements.
- B. Storage of Materials:
 - 1. Store materials in dry, enclosed area, off ground and away from possible contact with water, ice, and snow.
 - 2. Prevent damage to materials during storage, including minimizing the time materials are stored at the Site before being incorporated into the Work. Store only sufficient quantity of building insulation materials at the Site required for continuous advancement of the Work without causing delay.
 - 3. Conform to Section 01 66 00, Product Storage and Handling Requirements.

1.6 SITE CONDITIONS

A. Environmental Conditions:

1. Complete the installation and concealment of building insulation materials as rapidly as possible to avoid damage from adjacent construction operations and adverse weather conditions.
2. Install building insulations when weather and temperature conditions comply with building insulations manufacturers' written recommendations.
3. Install building insulations when damaging environmental condition are not forecasted for the time when exposed systems materials components would be exposed to potential damage from the elements.
4. Protect building insulation Work from precipitation, frost, and direct sunlight.
5. Do not apply pressure-sensitive tape when temperature is below 35 degrees F or above 110 degrees F.
6. Record decisions, conditions, and agreements to proceed with the Work when weather conditions may be unfavorable. State reasons for proceeding, along with names of persons involved, and changes or revisions (if any), if required, to allow the Work to proceed.

1.7. SCHEDULING

- A. Proceed with building insulation Work when preceding Work is ready to receive the Work of this Section.
- B. Proceed with building insulation and associated Work after curbs, blocking, substrate board, nailer strips, vents, drains and other projections through the substrates have been installed, and when substrate construction and framing of openings is complete.
- C. Proceed with and complete the Work when materials, equipment and tradesmen required for the installation of building insulation and backfilling operations are at the Site and ready to follow with the Work in manner that does not leave the Work vulnerable to damage or deterioration.
- D. Do not advance installation of building insulation beyond that necessary for proper sequencing of the Work. Do not advance the Work when there is no proper and secure protection from damaging weather and construction activities.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Performance Criteria:

1. Thermal Conductivity: Thicknesses shown are for thermal conductivity, k-value at 75 degrees F, specified for each material.
2. Provide adjusted thicknesses based on thicknesses shown or specified for building insulations, as required to comply with required thermal resistances for material having different thermal conductivity.

2.2 MATERIALS

A. Foam Plastic Insulations: Provide the following types:

1. General: Rigid, closed-cell, thermally stabilized, extruded, hydrochlorofluorocarbon blown, foam board insulation consisting of 100 percent virgin extruded polystyrene modified resin complying with ASTM C578.
2. Provide blowing agent with lowest available ozone depletion potential, such as HCFC-142b or better. HCFC-141b is not acceptable.
3. Perimeter Foundation Insulations: Provide very high-load-resisting, rigid foam board insulation complying with ASTM C578, Type VI.
 - a. Physical Properties: Provide the following:
 - 1) Thermal Conductivity (k), ASTM C177 and ASTM C518: 0.20 Btu/inch/hour/square foot/degree F.
 - 2) Compressive Strength (psi at five percent deformation) ASTM D1621: 40 psi minimum.
 - 3) Flexural Strength, ASTM C203: 60 psi minimum.
 - 4) Coefficient of Thermal Expansion, ASTM D696: 3.5×10^{-5} inches/inch/degree F.
 - 5) Water Absorption, ASTM C272: Less than 0.1 percent by volume maximum.
 - 6) Water Vapor Permeance, ASTM E96: 0.3 to 0.8 perms/inch maximum.
 - 7) Flame Spread, ASTM E84: Five.
 - 8) Smoke Developed, ASTM E84: 165 maximum.
 - b. Thickness: One layer each two inches thick.
 - c. Width: 2.0 feet.
 - d. Length: 8.0 feet.
 - e. Products and Manufacturers: Provide one of the following:
 - 1) STYROFOAM 40 HIGH LOAD by the Dow Chemical Company.
 - 2) Foamular 400 by Owens-Corning Fiberglass Corporation.
 - 3) Or equal.
4. Preformed Concrete Masonry Unit Core Insulation: Provide individually molded expanded polystyrene core insulation complying with ASTM C236, and ASTM C578, Standard Type I.
 - a. Physical Properties:
 - 1) Thermal Conductivity (k), ASTM C177: 0.26 Btu/inch/hour/square foot/degree F.

- 2) Density, ASTM C303: 0.90 to 1.14 pounds per cubic foot (pcf) minimum.
 - 3) Compressive Strength (psi at 5 percent deformation), ASTM D1621: 10 to 13 pcf.
 - 4) Water Vapor Transmission, ASTM E96: 1.4 perm/inch.
 - 5) Dimensional Stability: ASTM D2126: 0.55 percent maximum.
 - 6) Flame Spread, ASTM E84: Five maximum.
 - 7) Smoke Development, ASTM E84: 130 maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Korfil Standard U-Shaped Block Insulation by Concrete Block Insulating Systems, Inc, Division of W. R. Grace Construction Products, Inc.
 - 2) Blocfil by Blocfil Company, Division of Patek Investment Corporation.
 - 3) Or equal.
- B. Mineral Fiber Insulation: Provide the following types:
1. General: Provide insulations formed from inorganic mineral fiber extrusions spun at 2,500 degrees F complying with ASTM C665 and ASTM C764.
 2. Loose Mineral Fiber Insulation: Provide non-asbestos rock, slag, or glass processed into fiber and formed into loose resilient wool mass or granular nodules complying with ASTM C764, Type 1 (for blowing) Type 2 (for pouring).
 - a. Physical Properties:
 - 1) Thermal Conductivity (k), ASTM C764: 0.46 Btu/inch/hour/square foot/degree F.
 - 2) Ignition Loss: Less than one percent (99 percent pure mineral fiber).
 - 3) Density, ASTM C 64: 1.5 pounds per cubic foot (pcf).
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Industrial Mineral Wool Fiber by Rock Wool Industries, Inc.
 - 2) FBX Insulating Wool by Fibrex, Inc.
 - 3) Or equal.
- C. Miscellaneous Materials and Accessories: Provide the following:
1. Adhesive for Bonding Insulation: Type recommended by insulation manufacturer and complying with fire resistance requirements.
 2. Mechanical Anchors: Type and size shown or, if not shown, as recommended by insulation manufacturer for type of application shown and condition of substrate.
 3. Safing Impaling Clips: Provide galvanized steel impaling clips complying with requirements of code authorities having jurisdiction at the Site and as recommended by insulation manufacturer for full system responsibility.
 4. Protection Board: Fiberboard sheathing or heavy-duty asphaltic panels as recommended by insulation manufacturer.
 5. Adhesive Tapes: Complete selection of insulation manufacturer's recommended taping materials.
 6. Bitumen: Asphalt, ASTM D 449.

PART 3 – EXECUTION

3.1 INSPECTION

- A. CONTRACTOR and installer shall examine substrate and conditions under which building insulation Work will be performed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surfaces to receive building insulation shall be clean of all debris, dirt, and other contamination before installation begins.

3.3 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to Site conditions, before proceeding with the Work obtain from manufacturer and submit to ENGINEER specific installation recommendations from manufacturer.
 - 2. Extend insulations full thickness over entire surface to be insulated. Cut and fit tightly around obstructions. Fill voids with insulation.
 - 3. Apply number of layers of insulation specified, each of required thickness, or required thickness to provide thermal value shown or indicated in the Contract Documents, to make up the total thickness.
- B. Unit-type Building Insulation:
 - 1. Apply insulation units of type shown or indicated to substrate by method indicated. If not otherwise indicated and except for units resting on horizontal surfaces, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
 - 2. Exercise extreme care to avoid damaging and soiling of faces on insulation units that will remain exposed-to-view. Align joints accurately, with adjoining surfaces set flush.
 - 3. Set vapor barrier faced units with vapor barrier to warm side of construction, (usually toward inside), except as otherwise shown or indicated. Do not obstruct ventilation spaces, except for fire-stopping.
 - 4. Tape joints and ruptures in vapor barriers using adhesive tape of type recommended by insulation manufacturer and seal each continuous area of insulation to surrounding construction so as to ensure vapor-tight installation of the units.
- C. Loose-type Insulation:
 - 1. Place loose fiber insulation into spaces and onto surfaces as shown or indicated, either by pouring or by machine-blowing. Level horizontal

applications to uniform thickness as indicated, lightly settle to uniform density, but not excessively compacted.

2. Stuff loose mineral fiber insulation into miscellaneous voids and cavity spaces as indicated. Compact to approximately 40 percent of normal maximum volume to density of approximately 2.5 pounds per cubic foot.

D. Board-type Perimeter and Under-Slab Insulation:

1. Install perimeter insulation after concrete footings have been poured and before on-grade concrete slab work begins.
2. Remove projections that interfere with placing.
3. Apply single 2.0-foot-wide continuous band of insulation of required thickness and number of layers at slab-on-grade buildings whether or not shown. Stagger joints between layers of insulation and butt insulation tightly together.
4. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of board-type perimeter insulation.
5. Tape bottom edge of insulation before temporarily attaching insulation to wall with mastic.
6. Tape all joints in vertical wall insulation.
7. Protect insulation on vertical surfaces from damage during backfilling by applying protection course material recommended by insulation manufacturer. Set in adhesive in accordance with recommendations of insulation manufacturers and protection course material.

E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

G. Correcting Defective Work:

1. System components that are dislodged, damaged, expanded, broken, penetrated, or crushed by subsequent installation operations or damaged by detrimental weather shall be immediately replaced with undamaged material in compliance with the Contract Documents and properly protected as specified.
2. Only original installer shall repair or replace deteriorated or defective Work.

3.4 PROTECTION

A. Protection from Elements:

1. Protect all components of the Work from detrimental weather conditions. Do not allow building insulation materials to become wet or soiled, or covered with ice or snow. Provide continuous protection of materials against damage, wetting and moisture absorption and storing materials as specified
2. Work that cannot, for reasons acceptable to ENGINEER, be covered with complete construction system before onset of weather detrimental to the Work, shall be completely covered and protected in manner that deflects precipitation from building insulations without damaging adjacent Work.
3. Protect foam plastic building insulation from exposure to sunlight.

B. Protection During Construction:

1. Protect all components of the Work from construction operations including, but not limited to, backfilling, framing, and sheathing, aluminum siding, and concrete unit masonry Work, until work is completed and acceptable to ENGINEER.
2. Protect building insulations from damage and abuse by other contractors and installers until readiness for final payment.
3. Do not allow building insulations to come into contact with welding operations or other fire or ignition sources.
4. Do not allow construction traffic not associated with installation of building insulation in the area of building insulation Work. Protect the area from access by other installers and contractors until the building insulation Work has been incorporated into finished construction systems.

C. Building insulation that becomes wet, damaged, or deteriorated shall be promptly removed from the Site and replaced with materials conforming to this Section.

+ + END OF SECTION + +

SECTION 07 71 00

ROOF SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install all roof specialties Work.
2. The extent of the roof specialties is shown.
3. The types of roof specialties Work required include, but is not necessarily limited to, the following:
 - a. Exposed gutters and downspouts.
 - b. Complete selection of full-strength, polyvinylidene fluoride finishes and colors with extended life topcoat.
 - c. Protective strippable film on all surfaces of snap-lock metal coping, extruded aluminum gravel stops, fascia extensions and metal coping corner and transition flashings.
 - d. Miscellaneous accessories, fasteners, cleats and incidental sheet metal flashing and trim system components necessary for a complete installation.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that shall be installed with the roof specialties Work.
2. Notify other contractors in advance of the installation of the roof specialties Work to provide other contractors with sufficient time for the installation of items included in their contracts that must be installed before the roof specialties Work.

C. Related Sections:

1. Section 05 50 13, Miscellaneous Metal Fabrications.
2. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. AAMA 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
2. FM Global, Loss Prevention Data for Roofing Contractors, 1-49 - Perimeter Flashing.
3. FS H-C-494, Coating Compound, Bituminous, Solvent Type, Acid Resistant.
4. FS TT-C-494, Federal Specification, Coating Compound, Bituminous, Solvent Type, Acid Resistant.
5. NRCA, The Roofing Manual.

6. SMACNA: Architectural Sheet Metal Manual.

1.3 QUALITY ASSURANCE

- A. Design Criteria:
 - 1. Standards: Comply with applicable standards and recommendations of SMACNA, Architectural Sheet Metal Manual, for the fabrication and installation of roof specialties Work, except to the extent more stringent requirements are specified.
- B. Component Supply and Compatibility: Provide roof specialties as a complete unit produced by a single manufacturer specializing in the production of this type of Work, including hardware, accessories, mounting and installation components.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Shop Drawings showing the manner of forming, jointing and securing the metal to form roof specialties Work. Show expansion joint details and water-proof connections to adjoining work and at obstructions and penetrations.
 - b. Drawings showing the coordination of the Work of this Section with other Work shown. Provide detailed Shop Drawings showing large scale details of sections and profiles of all roof specialties to be used in the Work, with all items, including fastener locations, cleats and other miscellaneous accessories necessary to complete the Work, fully dimensioned, properly located, quantified and presented such that sequence of installation is acceptable to each roofing system and adjacent construction material installer.
 - 2. Product Data:
 - a. Copies of manufacturer's specifications, recommendations and installation instructions for roof specialties applications. Include manufacturer's certification or other data substantiating that the materials comply with the requirements.
 - 3. Samples:
 - a. Each item of roof specialty, demonstrating assembly of system joint components and fasteners, securely mounted to substrate simulating actual installation in the Work.
 - b. Polyvinylidene fluoride manufacturer's color samples for final selection by ENGINEER. After initial selection of colors by ENGINEER from manufacturer's color charts, submit ENGINEER'S preliminary color choices on actual samples of metal substrate for final color selections by ENGINEER.
 - c. Samples will be reviewed by ENGINEER for color and texture only. Compliance with other requirements is the responsibility of CONTRACTOR.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver, store and handle materials to preclude denting, scratching or otherwise marring the surface and finish of the roof specialties material.
2. Items delivered in broken, damaged, rusted, or unlabeled condition shall immediately be removed from Site and not offered again for approval by ENGINEER.

B. Storage of Materials:

1. Store materials in an area undercover and protected from construction traffic.
2. Store materials in same package in which they were shipped, off the ground and on platforms protected from dirt and other contamination.
3. Store in a manner which does not permit water to remain on roof specialties materials and system components.

C. Handling of Materials:

1. Protect roof specialties from dents, scratches, warps and bends.
2. Remove strippable protective film, immediately preceding installation of each system component.

1.6 JOB CONDITIONS

A. Scheduling:

1. Coordinate roof specialties Work with roofing, flashing, trim, and the construction of decks, parapets and other adjoining work, to provide a permanently watertight, leak-proof, secure and non-corrosive installation.
2. Deliver materials to the Site in sufficient quantities to ensure uninterrupted progress of the Work.
3. Schedule the installation of roof specialties to coincide with the installation of roofing, waterproofing, drains, piping, blocking, nailers, reglets, framing at openings, curbs, parapets and other adjoining and substrate Work.
4. Proceed with and complete the Work only when materials, equipment, and knowledgeable tradesmen, required for the installation of roof specialties, are at the Site and are ready to follow, and integrate roof specialties Work with roofing Work, in order to maintain watertight conditions.

1.7 WARRANTY

- A. Provide gutter manufacturer's fifteen-year warranty against blow-off, leak, or premature failure in winds of up to 90 miles per hour.
- B. Provide manufacturer's twenty-year warranty on the specified polyvinylidene fluoride-based coating.
- C. Guarantee that the polyvinylidene fluoride-based coating meets all criteria specified and will not spall, check, craze, peel or otherwise lose adhesion for a period of twenty years from the date of installation, to the extent that such shall create

unsightly conditions or otherwise impair the intended architectural qualities of the building.

- D. In the event that the polyvinylidene fluoride-based coating fails to meet the specified standards the manufacturer shall, at their own expense, replace or field paint, at the discretion of OWNER, all areas affected by the failure. In the event that repainting is selected, it shall be done at mutually agreeable intervals throughout the term of the warranty.
- E. The warranty specified shall not deprive OWNER of other rights OWNER may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by CONTRACTOR under requirements of the Contract Documents.
- F. The warranty does not apply where failure is caused by accidents, or external conditions or forces beyond the control of the manufacturer.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Performance Criteria:
 - 1. Roof specialties shall be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.
 - 2. Comply with fabrication details recommended by FM Global, Loss Prevention Data for Roofing Contractors; SMACNA, Architectural Sheet Metal Manual; The NRCA Roofing Manual, and the requirements of the roof specialties manufacturer, and as shown on approved Shop Drawings.

2.2 MATERIALS

- A. Gutters and Downspouts:
 - 1. Provide aluminum sheet 6063-T6 alloy, with smooth finish; in accordance with SMACNA.
 - 2. Size, Thickness, and Profile:
 - 1. Gutters and Downspouts: 1/8-inch thick; As shown.
 - 3. Products and Manufacturers: Provide one of the following:
 - a. Custom Gutters and Downspouts by Architectural Products Company.
 - b. Custom Seal-Tite Gutters, and Industrial Downspouts by Metal-Era Incorporated.
 - c. Or equal.
 - 4. Miscellaneous Materials:
 - a. Provide the materials and types of fasteners, solder, welding rods, coatings, separators, aluminum wall penetration, sealants, and accessory items as recommended by the sheet metal manufacturer for roof specialties Work, except as otherwise shown.

- b. Cleats and Straps: Same metal as roof specialties Work being anchored or supported.
- c. Roofing Cement: Neoprene adhesive, compatible with substrate and adjoining work.
- d. Bituminous Coating: Cold-applied asphaltic coating, FS TT-C-494, Type II, compounded for minimum thickness per coat of 15-mils (dry).
- e. Miscellaneous steel scuppers, escutcheons, and bearing plates: Refer to Section 05 50 13, Miscellaneous Metal Fabrications.

2.3 FABRICATION

A. General:

- 1. The fabrication requirements for roof specialty Work apply to both shop-fabricated and on-site-fabricated Work.
- 2. Manufacturer's Recommendations: Except as otherwise shown or specified, comply with the recommendations and instructions of the manufacturer of the roof specialty being fabricated.
- 3. Provide for thermal expansion of exposed items. Maintain a water-tight seal at expansion joints. Locate expansion joints at the following maximum spacings:
 - a. Midpoint of run.
- 4. Fabricate Work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering the temper and reflectivity of the metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back the sheet metal to form a hem on the concealed side of exposed edges.
- 5. Fabricate drainage sumps and downspouts and supports as shown.
- 6. Support and Anchorage: Fabricate units with adequate provisions for support and anchorage, of the types required for the indicated method of installation.

- B. Aluminum Drainage Sump and Downspouts: Fabricate aluminum sheet using double flat-lock seams. Rivet joints where necessary for strength. Pop rivets are not acceptable.

2.4 FINISHES

- A. High-Performance Organic Finish (Three-Coat Fluoropolymer): AAMA 2605:manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 621 and the coating and resin manufacturers' written instructions.
 - 1. Colors: Provide the following:
 - a. Full selection of manufacturer's standard colors for final selection by ENGINEER.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Kynar 500 Fluoropon by the Valspar Corporation.
 - b. Kynar 500 Duranar XL by PPG Industries.

- c. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. CONTRACTOR and installer shall examine the supporting structure and other elements of the substrate and conditions under which the roof specialties Work is to be performed and notify ENGINEER, in writing, of any conditions detrimental to the proper and timely completion of the Work and performance of the drainage sumps, roof and overflow drains, and downspouts. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 PREPARATION

- A. Wherever possible, take field measurements, prior to completion of shop fabrication and finishing of roof specialties Work. Do not delay job progress. Allow for erection tolerances corresponding with specified tolerances where final dimensions cannot be established before fabrication.

3.3 INSTALLATION

- A. Comply with manufacturer's recommendations and installation instructions.
- B. Protection of Aluminum from Dissimilar Materials: Coat all aluminum surfaces in contact with dissimilar materials such as concrete, masonry, steel and other metals as specified in Section 09 91 00, Painting.
- C. Conceal fasteners and expansion provisions, wherever possible, in exposed Work, and locate so as to minimize the possibility of leakage. Cover and seal Work, as required, for a tight installation.
- D. Provide concealed cleat-type anchorages wherever practical and arrange to relieve stresses in the roof specialties Work which result from building movement and thermal expansion.
- E. Splice and Expansion Units: Use 0.050-inch thick splice plates.
- F. Bed flashing flanges in a bed of roofing cement or other setting compound which is compatible with adjoining work and substrate.
- G. On vertical overlaps, lap sheet metal a minimum of 3-inches.
- H. On sloping overlaps, of slopes of not less than 6-inches in 12-inches, lap unsealed overlaps a minimum of 6-inches.

- I. For embedment of metal flanges in elastic sheet flashing or stripping, extend flanges for a minimum of 4-inches embedment.
- J. Support and anchor each unit of Work in the manner as shown, but in no case in a manner which would be inadequate for thermal expansion stresses and the normal loading of water, wind and similar loadings.
- K. Install units with lines and corners true and accurate in alignment and location. Install drainage sumps to assure positive drainage to downspouts.

3.4 FIELD QUALITY CONTROL

- A. Polyvinylidene Fluoride Based Coatings: Determine conformity of sheet metal flashing and trim Work requiring painted finish to these Specifications as follows:
 - 1. The manufacturer of the roofing specialties Work shall set aside and label samples of each component of the sheet metal flashing and trim Work from each production lot for the Project. Protect samples from weather.
 - 2. Make samples of sheet metal flashing and trim Work available at all times, for comparison with installed sheet metal flashing and trim Work as requested by OWNER, for the full time of the warranty.
 - 3. Make color comparison measurements with a Hunter Tristimulus Color Difference Meter employing methods of computation in use at the National Bureau of Standards.

3.5 CLEANING AND PROTECTION

- A. Protect the roof specialties from all damage until Final Completion.
- B. Roof specialties damaged before Final Completion shall be replaced with new material as specified herein, at no additional cost to OWNER.
- C. Clean exposed surfaces of every substance which is visible or might cause corrosion of the metal or deterioration of the finish.

+ + END OF SECTION + +

SECTION 07 92 00

JOINT SEALANTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install joint sealants.
2. Extent of each type of calking and sealant is shown or indicated and includes the following:
 - a. Interior and exterior joints in equipment and construction systems not filled by another material, and that are not required to be open for operation.

B. Coordination:

1. Review installation procedures under other Sections and coordinate installation of items to be installed with or before joint sealants.
2. Notify other contractors in advance of installation of joint sealants to provide other contractors with sufficient time for installing items included in their contracts to be installed before joint sealants.
3. Coordinate final selection of joint sealants so that materials are compatible with all calking and sealant substrates specified.

C. Related Sections:

1. Section 04 00 05, Masonry.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM C510, Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
2. ASTM C661, Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
3. ASTM C793, Test Method for Effects of Accelerated Weathering on Elastomeric Joint Sealants.
4. ASTM C794, Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
5. ASTM C920, Specification for Elastomeric Joint Sealants.
6. ASTM C1021, Practice for Laboratories Engaged in Testing Building Sealants.
7. ASTM C1087, Test method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
8. ASTM C1193, Guide for Use of Joint Sealants.

9. ASTM C1247, Practice for Durability of Sealants Exposed to Continuous Immersion in Liquids.
10. BAAQMD Regulation 8, Rule 51.
11. FS TT-S-00227, Sealing Compound: Elastomeric Type, Multi-component (for Calking, Sealing, and Glazing in Buildings and Other Structures).
12. FS TT-S-00230 Sealing Compound: Elastomeric Type, Single Component (for Calking, Sealing, and Glazing in Buildings and Other Structures).
13. NSF/ANSI Standard 61, Drinking Water System Components - Health Effects.
14. SCAQMD Rule 1168.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
 - a. Engage a single installer, approved by product manufacturer, regularly engaged in calking and sealant installation and with successful experience in applying types of products required, and who employs only tradesmen with specific skill and successful experience in the type of Work required.
2. Testing Laboratory:
 - a. Furnish services of independent testing laboratory qualified according to ASTM C1021, for conducting testing required.

B. Component Supply and Compatibility:

1. Obtain materials only from manufacturers who will, if required:
 - a. Furnish at the Site services of a qualified technical representative to advise installer of proper procedures and precautions for using materials.
 - b. Test joint sealants for compatibility with substrates for conformance with FS-TT-S-00227, and recommend remedial procedures as required.
2. Before purchasing each sealant, investigate its compatibility with joint surfaces, joint fillers, and other materials in joint system. Provide products that are fully compatible with actual installation condition, verified by manufacturer's published data or certification, and as shown on approved Shop Drawings and other approved submittals.

C. Product Testing: Provide test results of laboratory pre-construction compatibility and adhesion testing, as specified in Article 3.1 of this Section, by qualified testing laboratory, based on testing of current sealant formulations within a 36-month period preceding the Notice to Proceed for the Work.

1. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920 and, where applicable, to other standard test methods.
2. Test other joint sealants for compliance using specified post-construction field adhesion test.

D. Pre-installation Conference:

1. Prior to installing joint sealants and associated Work, schedule and meet at the Site with calking and sealant installer, calking and sealant manufacturer's technical representative, other trades involved in coordinating with calking and sealant Work, ENGINEER, and OWNER. Record discussions of pre-installation conference and decisions, agreements, and disagreements, and furnish copy of record to each party attending conference. Review foreseeable methods and procedures related to calking and sealant Work, including reviewing:
 - a. Required submittals, both completed and yet to be completed.
 - b. Status of test reports.
 - c. Mock-up construction results.
 - d. Status of substrate and similar considerations.
 - e. Each major calking and sealant application required.
 - f. Availability of products, tradesmen, equipment, and facilities required for avoiding delays.
2. Reconvene conference at earliest opportunity if additional information must be developed to conclude subjects under consideration.
3. Record revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Schedule of joint sealants installation, indication each specific surface where calking or sealants are to be provided and the material proposed for each application.
2. Product Data:
 - a. Copies of manufacturer's data sheets including color charts, specifications, recommendations, and installation instructions for each type of sealant, calking compound, and associated miscellaneous material required. Include manufacturer's published data, indicating that each product complies with the Contract Documents and is intended for the applications shown or indicated.
 - b. Product test reports.
3. Samples:
 - a. Each type of actual cured material of each calking and sealant specified, in each of manufacturer's standard colors.
 - b. Samples will be reviewed by ENGINEER for color and texture only. Compliance with other requirements is responsibility of CONTRACTOR.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Certify that materials are suitable for intended use and materials meet or exceed requirements of the Contract Documents.
 - b. Certification from manufacturer that products furnished are appropriate for surfaces and conditions to which they will be applied.

- c. Certify that applicator is approved by manufacturer.
 - 2. Field Quality Control Submittals:
 - a. Results of tests on job mock-ups.
 - b. Pre-construction and post-construction field test reports.
 - c. Compatibility and adhesion test reports.
 - d. Contractor's Field Test Report Logs:
 - 1) Indicate time present at the Site.
 - 2) Include observations and results of field tests, and document compliance with manufacturer's installation instructions and supplemental instructions provided to installers.
 - 3. Pre-installation conference record.
 - 4. Qualifications: Submit qualifications for:
 - a. Installer.
 - b. Testing laboratory (if not already submitted under Section 01 45 23, Testing Laboratory Services Furnished by Owner, or Section 01 45 13, Testing Laboratory Services Furnished by Contractor).
- C. Closeout Submittals: Submit the following:
- 1. Operation and Maintenance Data:
 - a. Recommended inspection intervals.
 - b. Instructions for repairing and replacing failed sealant joints.
 - 2. Warranty: Submit written warranties as specified in this Section.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with Section 01 65 00, Product Delivery Requirements, and Section 01 66 00, Product Storage and Handling Requirements, and the following:
 - 1. Delivery of Products:
 - a. Deliver products in calking and sealant manufacturer's original unopened, undamaged containers, indicating compliance with approved Shop Drawings and approved Sample color selections.
 - b. Include the following information on label:
 - 1) Name of material and Supplier.
 - 2) Formula or Specification Section number, lot number, color and date of manufacture.
 - 3) Mixing instructions, shelf life, and curing time, when applicable.
 - 2. Storage of Products:
 - a. Do not store or expose materials to temperature above 90 degrees F or store in direct sunlight.
 - b. Do not use materials that are outdated as indicated by shelf life.
 - c. Store sealant tape in manner that will not deform tape.
 - d. In cool or cold weather, store containers for sixteen hours before using in temperature of approximately 75 degrees F.
 - e. When high temperatures prevail, store mixed sealants in a cool place.
 - 3. Handling:
 - a. Do not open containers or mix components until necessary preparatory Work and priming are complete.

1.6 JOB CONDITIONS

A. Environmental Conditions:

1. Do not install joint sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
2. Proceed with the Work when forecasted weather conditions are favorable for proper cure and development of high-early bond strength.
3. Where joint width is affected by ambient temperature variations, install elastomeric sealants when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.
4. When high temperatures prevail, avoid mixing sealants in direct sunlight.
5. Supplemental heat sources required to maintain both ambient and surface temperatures within the range recommended by manufacturer for material applications are not available at the Site.
6. Provide supplemental heat and energy sources, power, equipment, and operating, maintenance, and temperature monitoring personnel.
7. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas of calking, sealants, and painting Work, and areas where OWNER's personnel or construction personnel may work. Properly locate and vent such heat sources to outdoors so that joint sealants and other Work are unaffected by exhaust.

1.7 WARRANTY

- ### A. Provide written warranty, signed by manufacturer and CONTRACTOR, agreeing to repair or replace sealants that fail to perform as air-tight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified in approved Shop Drawings and other submittals, as an inherent quality of material for exposure indicated.
1. Provide manufacturer warranty for period of one year from date of Substantial Completion of joint sealants Work.
 2. Provide installer warranty for period of two years from date of Substantial Completion of joint sealants Work.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- ### A. Provide elastomeric joint sealants for interior and exterior joint applications that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- ### B. VOC Performance Criteria:

1. VOC content of sealants used shall comply with current VOC content limits of SCAQMD Rule 1168. Sealants used as fillers shall comply with or exceed requirements of BAAQMD Regulation 8, Rule 51.
 - a. Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
- C. Provide colors selected by ENGINEER from calking and sealant manufacturer's standard and custom color charts. "Or equal" manufacturers shall provide same generic products and colors as available from manufacturers specified.

2.2 MATERIALS

- A. Exterior and Interior Vertical Joints; Non-submerged:
 1. Two-component Polyurethane Sealant:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Sikaflex- 2c NS by Sika Corporation.
 - 2) Dymeric 240 FC by Tremco Sealant/Waterproofing Division of RPM International, Inc.
 - 3) Or equal.
 - b. Polyurethane based, two-component elastomeric sealant complying with:
 - 1) FS TT-S-00227E: Type II (non-sag) Class A and ASTM C920, Type M, Grade NS, Class 25.
 - 2) Adhesion-in-Peel, FS TT-S-00227E and ASTM C794: (Minimum five pounds per linear inch with no adhesion failure): 10 pounds.
 - 3) Hardness (Standard Conditions), ASTM C661: 25 to 35 (Shore A).
 - 4) Stain and color change, FS TT-S-00227E and ASTM C510: No discoloration or stain.
 - 5) Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weatherometer.
 - 6) Rheological Vertical Displacement at 120 degrees F, FS TT-S-00227E: No sag.
 - 7) VOC Content: 100 g/L, maximum.
- B. Exterior and Interior Horizontal Joints; Non-submerged:
 1. Two-component Polyurethane Sealant:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Sikaflex- 2c SL by Sika Corporation.
 - 2) THC/900 by Tremco Sealant/Waterproofing Division of RPM International, Inc.
 - 3) Or equal.
 - b. Polyurethane based, two-component elastomeric, self-leveling sealant complying with the following:
 - 1) FS TT-S-00227E, Type I (self-leveling) Class A. and ASTM C920, Type M, Grade P, Class 25
 - 2) Water Immersion Bond, FS TT-S-00227E: Elongation of 50 percent with no adhesive failure.

- 3) Hardness (Standard Conditions), ASTM C661: 35 to 45.
- 4) Stain and Color Change, FS TT-S-00227E and ASTM C510: No discoloration or stain.
- 5) Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weatherometer.
- 6) VOC Content: 165 g/L, maximum.

C. Miscellaneous Materials:

1. Joint Cleaner: As recommended by calking and sealant manufacturer.
2. Joint Primer and Sealer: As recommended for compatibility with calking and sealant by calking and sealant manufacturer.
3. Bond Breaker Type: Polyethylene tape or other plastic tape as recommended for compatibility with calking and sealant by calking and sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of calking and sealant. Provide self-adhesive tape where applicable.
4. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended for compatibility with calking and sealant by calking and sealant manufacturer. Provide size and shape of rod that will control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide highly-compressible backer to minimize possibility of sealant extrusion when joint is compressed.
5. Low-temperature Catalyst: As recommended by calking and sealant manufacturer.

D. Products for Other Applications:

1. Glazing Sealants: Refer to Section 08 81 00, Glass Glazing.
2. Compressible Filler: Refer to Section 04 00 05, Masonry.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine joint surfaces, substrates, backing, and anchorage of units forming sealant rabbet, and conditions under which calking and sealant Work will be performed, and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work and performance of sealants. Do not proceed with calking and sealant Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Protection: Do not allow joint sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces including rough textured materials. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or calking and sealant materials.

B. Joint Surface Preparation:

1. Clean joint surfaces immediately before installing sealant compound. Remove dirt, weakly adhering coatings, moisture and other substances that would interfere with bonds of sealant compound as recommended in sealant manufacturer's written instructions as shown on approved Shop Drawings.
2. If necessary, clean porous materials by grinding, sandblasting, or mechanical abrading. Blow out joints with oil-free compressed air or by vacuuming joints prior to applying primer or sealant.
3. Roughen joint surfaces on vitreous coated and similar non-porous materials, when sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or steel wool to produce a dull sheen.
4. Concrete Joint Preparation: Refer to Section 03 15 00, Concrete Accessories

C. Mixing:

1. Comply with sealant manufacturer's written instructions for mixing multi-component sealants.
2. Thoroughly mix components before use.
3. Add entire contents of activator can to base container. Do not mix partial units.
4. Mix contents for minimum of five minutes or as recommended by sealant manufacturer, until color and consistency are uniform.

3.3 INSTALLATION

- A. Install joint sealants after adjacent areas have been cleaned and before joint has been cleaned and primed, to ensure calking and sealant joints will not be soiled. Replace calking and sealant joints soiled after installation.
- B. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or indicated in the Contract Documents, and except where manufacturer's technical representative directs otherwise, only as acceptable to ENGINEER.
- C. Prime or seal joint surfaces as shown on approved Shop Drawings and approved other submittals. Do not allow primer or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to applying sealants.
- D. Apply masking tape before installing primer, in continuous strips in alignment with joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.
- E. Confirm that compressible filler is installed before installing sealants. Refer to Section 04 00 05, Masonry, for locations.
- F. Do not install sealants without backer rods and bond breaker tape.

- G. Roll back-up rod stock into joint to avoid lengthwise stretching. Do not twist, braid, puncture, or prime backer rods.
- H. Employ only proven installation techniques that will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete “wetting” of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- I. Install sealants to depths recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of bead.
 - 1. For horizontal joints in sidewalks, pavements, and similar locations sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to depth equal to 75 percent of joint width, but not more than 5/8-inch deep or less than 3/8-inch deep.
 - 2. For vertical joints subjected to normal movement and sealed with elastomeric sealants and not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2-inch deep or less than 1/4-inch deep.
- J. Remove excess and spillage of compounds promptly as the Work progresses.
- K. Cure caulking and sealant compounds in compliance with manufacturer’s instructions and recommendations, to obtain high-early bond strength, internal cohesive strength, and surface durability.

3.4 EXISTING JOINTS

- A. Mechanically remove existing sealant and backer rod.
- B. Clean joint surfaces of residual sealant and other contaminants capable of affecting sealant bond to joint surface.
- C. Conduct laboratory pre-construction compatibility and adhesion testing on joint surfaces in accordance with Paragraph 3.1.B of this Section.
- D. Allow joint surfaces to dry before installing new sealants.

3.5 FIELD QUALITY CONTROL

- A. Post-construction Field Adhesion Testing: Before installing elastomeric sealants, field-test joint sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform ten tests for the first 1,000 feet of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 1,000 feet of joint length thereafter, and minimum of one test per each floor per elevation.

- c. Test Method: Test joint sealants according to Method A, Field-applied Sealant Joint Hand Pull Tab, and Method D, Water Immersion in Appendix X1 of ASTM C1193. For joints with dissimilar substrates, verify adhesion to each substrate separately by extending cut along one side and verifying adhesion to opposite side. Repeat procedure for opposite side.
- d. Inspect joints for complete fill, absence of voids, and joint configuration complying with specified requirements. Record results in a log of field adhesion tests.
- e. Inspect tested joints and report on whether:
 - 1) 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 type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - 2) Sealants filled the joint cavities and are free of voids.
 - 3) Sealant dimensions and configurations comply with specified requirements.
- f. Record test results in a log of field adhesion tests. 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 fill, sealant configuration, and sealant dimensions.
- g. 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.
- h. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other requirements will be 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.
- i. Do not proceed with installation of elastomeric sealants over joint surfaces that have been painted, lacquered, waterproofed, or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with FS TT-S-00227, has successfully demonstrated that sealant bond is not impaired by the coating or treatment. If laboratory test has not been performed or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.

B. Water Leak Testing: Field test for water leaks as follows:

- 1. Flood the joint exposure with water directed from a 3/4-inch diameter garden hose, without nozzle, held perpendicular to wall face, two feet from joint and connected to water system with 30 psi minimum normal water pressure. Move stream of water along joint at an approximate rate of 20 feet per minute.
- 2. Test approximately five percent of total joint system, in locations that are typical of every joint condition, and that can be inspected easily for leakage

on opposite face. Conduct test in presence of ENGINEER, who will determine actual percentage of joints to be tested and actual period of exposure to water from hose, based on extent of observed leakage or lack of observed leakage.

3. Where nature of observed leaks indicates potential of inadequate joint bond strength, ENGINEER may direct that additional testing be performed at a time when joints are fully cured, and before Substantial Completion.

3.6 ADJUSTING AND CLEANING

- A. Where leaks and lack of adhesion are evident, replace sealant.
- B. Clean adjacent surfaces of sealant and soiling resulting from the Work. Use solvent or cleaning agent recommended by sealant manufacturer. Leave all finish Work in neat, clean condition.
- C. Protect sealants during construction so that they will be without deterioration, soiling, or damage at time of readiness for final payment of the Contract.

3.7 PROTECTION

- A. During and after curing period, protect joint sealants 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 and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original Work.

+ + END OF SECTION + +

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install expansion joint cover assemblies.
2. The extent of expansion joint cover assemblies shall be as shown; including notes and details indicating style and types of installation.
3. The types of expansion joint cover assemblies include the following:
 - a. Wall expansion joint cover assemblies.
 - b. Roof expansion joint cover assemblies.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the expansion joint cover assemblies Work.
2. Notify other contractors in advance of the installation of the expansion joint cover assemblies to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the expansion joint cover assemblies Work.

C. Related Sections:

1. Section 13 34 19, Pre-Engineered Metal Building.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. AAMA 611: Voluntary Guide for Anodized Architectural Aluminum
2. AAMA 2605, Voluntary Specification, Performance Requirements, and Test Procedures for Superior Performance Organic Coatings on Aluminum Extrusions and Panels. (AA- C12C40R1x)
2. ASCE/SEI 7, Minimum Design Loads for Buildings and Other Structures.
3. ASTM B 209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM B 221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
5. ASTM C 665, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
6. ASTM D 1187, Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

7. ASTM D 2000, Standard Classification System for Rubber Products in Automotive Applications.
8. ASTM D 4434, Specification for PolyVinyl Chloride Sheet Roofing.
9. ASTM D 4637, Specification for EPDM Sheet Used In Single-Ply Roof Membrane.
10. ASTM E 1966, Test Method for Fire-Resistive Joint Systems.
11. ASTM E 1980, Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
12. Code of Federal Regulations, 40 CFR 59, National Volatile Organic Compound Emission Standards for Consumer and Commercial Products.
13. FM Global Property Loss Prevention Data Sheet 1-29, FM 1-90,
14. UL 2079, Tests for Fire Resistance of Building Joint Systems.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 1. Manufacturer shall have a minimum of five years experience producing substantially similar products and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
- B. Installer Qualifications:
 1. Engage a single installer who is a recognized expansion joint cover installer, skilled and experienced in the type of expansion joint covers Work required, and equipped to perform workmanship in accordance with recognized standards so that there will be undivided responsibility for the performance of the Work. Submit name and qualifications to ENGINEER along with at least three successfully completed Projects including names and telephone numbers of owners, architects, and engineers, responsible for the project and the approximate contract price for expansion joint cover work.
 2. The installer of the roof expansion joint cover Work shall be franchised or otherwise accepted in writing by the roofing materials manufacturer for installation of fully guaranteed roofing Work in accordance with these Specifications.
- C. Component Supply and Compatibility:
 1. Obtain all products included in this Section regardless of the component manufacturer from a single expansion joint cover assemblies manufacturer.
 2. The expansion joint cover assemblies manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the expansion joint cover assemblies manufacturer.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Shop Drawings: Submit the following:

- a. Dimensioned plans of all joint cover locations, details of fabrication and installation, including anchorage method. Include setting drawings and templates for location and installation of expansion joint cover assemblies.
 - 2. Product Data:
 - a. Copies of manufacturer's specifications, recommendations and installation instructions for roof specialties applications. Include manufacturer's certification or other data substantiating that the materials comply with the requirements.
 - 3. Samples:
 - a. Each type of metal finish. Sample not less than 6-inches long.
 - b. Available elastomer colors.
 - c. Samples will be reviewed by ENGINEER for color and texture only. Compliance with all other requirements is the exclusive responsibility of CONTRACTOR.
- B. Closeout Submittals: Submit the following:
- 1. Warranty Documentation:
 - a. Submit warranty as specified in Article 1.7

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
- 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete and masonry in ample time to prevent delay of that Work.
- B. Storage and Protection:
- 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect aluminum members and packaged materials from corrosion and deterioration.
- C. Acceptance at Site:
- 1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

1.6 JOB CONDITIONS

- A. Scheduling:
- 1. Coordinate roof expansion joint cover Work with roofing, flashing, trim, and the construction of decks, parapets, and other adjoining work, to provide a permanently watertight, leak-proof, secure and non-corrosive installation.
 - 2. Deliver materials to the Site in sufficient quantities to ensure uninterrupted progress of the Work.

3. Schedule the installation of roof expansion joint covers to coincide with the installation of roofing, waterproofing, drains, piping, blocking, nailers, reglets, framing at openings, curbs, parapets, and other adjoining and substrate Work.
4. Proceed with and complete the Work only when materials, equipment and knowledgeable tradesmen, required for the installation of roof expansion joint covers, are at the Site and are ready to follow, and integrate expansion joint covers Work with roofing Work, in order to maintain watertight conditions.

1.7 WARRANTY

- A. Provide manufacturer's twenty-year warranty on the specified polyvinylidene fluoride based coating.
- B. Guarantee that the polyvinylidene fluoride based coating meets all criteria specified and will not spall, check, craze, peel or otherwise lose adhesion for a period of twenty years from the date of installation, to the extent that such shall create unsightly conditions or otherwise impair the intended architectural qualities of the building.
- C. In the event that the coated polyvinylidene fluoride based coating fails to meet the specified standards the manufacturer shall, at their own expense, replace or field paint, at the discretion of OWNER, all areas affected by the failure. In the event that repainting is selected, it shall be done at mutually agreeable intervals throughout the term of the warranty.
- D. The warranty specified shall not deprive OWNER of other rights OWNER may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by CONTRACTOR under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. General: Provide expansion control systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
 1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where expansion control systems change direction or abut other materials.
 2. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion control systems.
 3. Coordination: Coordinate installation of exterior wall and soffit expansion control systems with roof expansion control systems to ensure that wall transitions are watertight. Roof expansion joint assemblies are specified elsewhere.

B. Performance Criteria:

1. Roof expansion joint covers shall be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.
2. Roof expansion joint covers shall be detailed, fabricated and installed to provide a minimum of FM 1-90 wind up-lift resistance and require no exposed fasteners of any kind.
3. Seismic Performance: Expansion control systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
 - b. Component Importance Factor is 1.5.
4. Solar Reflectance Index: Not less than 78 for a low slope roof of 2:12 or less and 29 for a steep slope roof of over 2:12 pitch when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

2.2 MATERIALS

- A. Aluminum: ASTM B 221 alloy 6063-T5 for extrusions; ASTM B 209, alloy 6061-T6, sheet and plate.
- B. EPDM Membrane: ASTM D 4637, Type standard with manufacturer for application.
- C. Neoprene Membrane: Neoprene sheet recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil; and as standard with roof-expansion-joint manufacturer for application.
- D. PVC Membrane: ASTM D 4434, Type standard with manufacturer for application.
- E. Silicone Extrusions: ASTM D 2000, UV stabilized, and that does not propagate flame. VOC content limit is that for multipurpose construction adhesives.
- F. Adhesives: As recommended by roof-expansion-joint manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
- H. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.
- I. Mineral-Fiber Blanket: ASTM C 665.
- J. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 ALUMINUM EXPANSION JOINT COVERS:

- A. Manufactured, continuous, joint-cover assembly; consisting of a formed or extruded metal cover secured to extruded aluminum frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing. Provide each size and type indicated, factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, and other components as recommended by expansion-joint manufacturer for complete installation. Fabricate each assembly specifically for installation configuration indicated on Drawings.
 - 1. Provide aluminum expansion joint cover assemblies of the profiles shown or specified.
 - 2. Provide roof expansion joint cover assemblies of the profiles shown or specified.
- B. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible seal and filler materials, and other accessories compatible with material in contact; as shown or required for complete installations.
- C. Provide a one piece, flexible vinyl condensation barrier with all roof and floor joint covers, in maximum lengths of 100 feet.
- D. Drain-Tube Assemblies: Equip moisture barrier with drain tubes and seals to direct collected moisture to drain.

2.4. FLANGED BELLOWS ROOF EXPANSION JOINTS

- A. Manufactured, continuous, waterproof, joint-cover assembly, consisting of exposed membrane bellows, laminated to flexible, closed-cell support foam, and secured along each edge to a 3- to 4-inch wide metal flange for nailing to substrate. Provide each size and type, factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation. Fabricate each assembly specifically for installation configuration indicated on Drawings.

2.5 FINISHES

- A. Aluminum contact surfaces on concrete; zinc chromate primer, except where anodic coating required.
- B. Aluminum Floor Covers; mill finish.
- C. Aluminum Covers, Except Floors; manufacturer's standard satin, clear anodic coating: AAMA 611, AA-M12C22A41, Class I, 0.018 mm.

D. Exterior Aluminum Covers:

1. High-Performance Organic Finish (Three-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coatings; Organic Coating: manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
2. Colors: Provide the following:
 - a. Full selection of manufacturer's standard colors for final selection by ENGINEER.
 - b. ENGINEER will select colors for expansion joint covers at time of Shop Drawing and sample submission review.
3. Products and Manufacturers: Provide one of the following:
 - a. Kynar 500 Fluoropon by the Valspar Corporation.
 - b. Kynar 500 Duranar XL by PPG Industries.
 - c. Or equal.

E. Wearing Surfaces: Manufacturer's standard, of the type as shown or specified.

F. Protection: Cover exposed metal surfaces of wall and ceiling covers with factory-applied adhesive paper or polyvinyl chloride (PVC) protective strippable coating.

2.6 FABRICATION

A. General:

1. Furnish the basic profile for expansion joint cover assemblies of joint widths shown or specified. Furnish the longest practicable lengths to minimize the number of joints, unless otherwise specified.
2. Butt joints for elastomeric covers shall be 20-feet apart, maximum. For sealing of joints during installation, use manufacturer's standard butt joint sealing method. Shop miter, weld, and pour all corners, cross-connections or other special transitions to meet the required conditions.

B. Wall and Ceiling Joint Cover Assemblies:

1. Furnish members fastened to wall or ceiling only on one side of the joint. Extend cover to lap each side of joint, with free movement. Attach cover to the anchor member, with the cover in close contact with adjacent contact surfaces.
2. For elastomeric covers, provide flush or surface mounted, factory poured covers for securing to each side of joint.

PART 3 - EXECUTION

3.1 INSPECTION

- A. CONTRACTOR shall examine the areas and conditions under which the Work is to be performed and notify ENGINEER, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 PREPARATION

- A. Prepare substrates according to expansion control system manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion control systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion control systems.
- C. Cast-In Frames: Coordinate and furnish frames to be cast into concrete or masonry.
- D. Coordinate the installation of the expansion control system with the roofing system. Refer to Section 13 34 19, Pre-Engineered Metal Building for details.

3.3 INSTALLATION

- A. Manufacturer's Instructions:
 - 1. In addition to the requirements of these Specifications, comply with manufacturer's instructions and recommendations for all phases of the Work, including preparation of substrate, applying materials, and protection of installed units.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion control systems.
 - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper expansion control system installation and performance.
 - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 4. Repair or grout blockout as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 5. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - 1. Provide in continuous lengths for straight sections.

2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer to both frame interfaces or sides of slabs before installing compression seals.
- E. Foam Seals: Install with adhesive recommended by manufacturer.
- F. Epoxy-Bonded Seals: Pressurize seal for time period and to pressure recommended by manufacturer. Do not over-pressurize.
- G. Terminate exposed ends of expansion control systems with field- or factory-fabricated termination devices.
- H. Moisture Barrier: Provide at all exterior joints and where indicated on Drawings. Provide drainage fittings at a maximum of 50 feet or where indicated on Drawings.
- I. Roof Expansion Joint Covers
1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
 2. Install roof expansion joints true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 3. Provide for linear thermal expansion of roof expansion joint materials.
 4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
 5. Provide uniform, neat seams.
 6. Install roof expansion joints to fit substrates and to result in watertight performance.
 7. Torch cutting of roof expansion joints is not permitted.
 8. Do not use graphite pencils to mark aluminum surfaces.
- J. Directional Changes and Other Expansion-Control Joint Systems: Coordinate installation of roof expansion joints with other expansion-control joint systems to result in watertight performance. Install factory-fabricated units at directional changes and at transitions between roof expansion joints and exterior expansion-control joint systems to provide continuous, uninterrupted, and watertight joints.
- K. Splices: Splice roof expansion joints with materials provided by roof-expansion-joint manufacturer for this purpose, to provide continuous, uninterrupted, and waterproof joints.
1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.

- L. 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 manufacture.

3.4 FIELD QUALITY CONTROL

- A. Polyvinylidene Fluoride Based Coatings: Determine conformity of expansion joint cover Work requiring painted finish to these Specifications as follows:
 - 1. The manufacturer of the expansion joint cover Work shall set aside and label samples of each component of the expansion joint cover Work from each production lot for the Project. Protect samples from weather.
 - 2. Make samples of expansion joint cover Work available at all times, for comparison with installed expansion joint cover Work as requested by OWNER, for the full time of the warranty.
 - 3. Make color comparison measurements with a Hunter Tristimulus Color Difference Meter employing methods of computation in use at the National Bureau of Standards.

3.5 CLEANING AND PROTECTION

- A. Do not remove strippable protective material until finish Work in adjacent areas is complete. When protective material is removed, clean exposed metal surfaces in accordance with manufacturer's instructions.

+ + END OF SECTION + +

SECTION 08 36 16

SECTIONAL DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, material, tools, equipment, and incidentals as shown, specified, and required to furnish and install sectional doors.
2. Extent of sectional doors is shown.
3. Types of products required include the following:
 - a. Galvanized steel, very-high-cycle, industrial quality sectional doors with insulated panels and full perimeter weather-stripping.
 - b. Tracks, angles, brackets, and supports.
 - c. Electric operators and chain operators, control stations, starters, safety edge devices and similar and associated components with all power and control connections (including disconnect switches).
 - d. Inserts and anchoring devices.
 - e. Miscellaneous materials and accessories for a completely functioning system.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the sectional doors.
2. Notify other contractors in advance of the installation of the upward acting sectional doors to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the sectional doors.
3. Coordinate delivery of inserts with masonry and cast-in-place concrete Work.

C. Related Sections:

1. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American Society for Testing and Materials, (ASTM).
 - a. ASTM A 36/A 36M, Specification for Carbon Structural Steel.
 - b. ASTM A 366/A 366M, Specification for Commercial Steel, Sheet, Carbon, (0.15 maximum percent) Cold-Rolled.
 - c. ASTM A 653/A 653M, Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the

- Hot-Dip Process.
2. National Electrical Code, (NEC).
 3. National Electrical Manufacturers' Association, (NEMA).

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
1. Manufacturer shall have a minimum of five years experience producing substantially similar equipment and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
- B. Installer Qualifications:
1. Engage a single installer for all sectional door Work, with documented and successful experience in the type of Work required, and who is an authorized representative of the sectional door manufacturer for both installation and maintenance of units required, and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work.
 2. Submit names and telephone numbers of architects, engineers, or owner's representatives for at least three successful projects performed by the proposed installer, similar to the Work required for this Project. Submissions that indicate proposed installer does not have the necessary successful experience will not be approved by Engineer.
- C. Component Supply and Compatibility:
1. Obtain all equipment included in this Section regardless of the component manufacturer from a single sectional door manufacturer.
 2. The sectional door equipment manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the sectional door equipment manufacturer.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Drawings showing all components and their assembly, all with accurately marked dimensions. Include details at frames, elevations of each sectional door design type, details of construction and conditions at openings.
 - b. Setting drawings; summary of loads on walls, jambs and structural elements; templates; and instructions and directions for installation of inserts and anchorage devices, which shall be furnished by the sectional door manufacturer, but installed, under other Sections of these Specifications.

2. Product Data:
 - a. Copies of manufacturer's specifications and data sheets, roughing-in diagrams, and installation instructions for each type and size of sectional door. Include manufacturer's data on operators, operating instructions, and maintenance data. Indicate by transmittal form that installer has received a copy of diagrams and installation instructions.
 - b. Calculations showing that detailing and fabrication of components are in compliance with structural performance specified.
 - c. Electric operator and all other operating system component specifications indicating compliance with requirements specified. Complete interconnecting wiring diagrams for power, signal and control systems indicating all system operating components and control station wiring as required for a completely operational system in compliance with the Specifications. Provide motor nameplate data and ratings; characteristics, mounting arrangements, size and location of winding termination lugs, conduit entry and grounding lugs; and coatings. Define and differentiate between components that are furnished and installed as part of sectional door Work; both at the Site and in the factory, and those that must be furnished, or installed, as part of the Work of other Sections or the work of other contractors.
- B. Informational Submittals: Submit the following:
 1. Qualification Statements:
 - a. Installer.
- C. Closeout Submittals: Submit the following:
 1. Operations and Maintenance Data: Upon completion of the Work, furnish copies of detailed maintenance manual including the following information:
 - a. Product name and number.
 - b. Name, address, e-mail address and telephone number of manufacturer and local distributor.
 - c. Detailed procedures for routine maintenance and cleaning.
 - d. Detailed procedures for light repairs.
 - e. Parts catalog listing all operating system parts and components by kind and purchasing designation number.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.
 2. Deliver all units suitably crated, from the factory to the Site, braced and protected against distortion and damage during transit and unloading. Label all parts to comply with approved Shop Drawing designations.
 3. Upon delivery, inspect metal for damage. Minor damage may be repaired provided the finish items are equal in all respects to new items and acceptable to Engineer; otherwise, remove and replace damaged items.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
2. Store doors and frames at the Site under cover.
3. Place units up off of floors in a manner that will prevent rust and damage.
4. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

PART 2- PRODUCTS

2.1 EQUIPMENT PERFORMANCE

A. Design Criteria:

1. Structural: Sectional door components shall be capable of resistance to the following loads:
 - a. Wind Loading: Provide resistance to both positive and negative wind loading pressure specified, with a maximum deflection of 1/120 of the opening width, as follows:
 - 1) Wind Loading Pressure: 30 pounds per square foot of door area.
 - b. Dead Loading: Provide resistance to deformation of door components caused by the effects of gravity loads.
 - c. Applied loadings shall not cause either short-term or permanent deformation of any system component. Doors shall remain operable and in undamaged condition during, and after, application of specified wind pressure loading.
2. Helically-wound Torsion Springs: Provide Very-High-Cycle design capable of performing for 100,000 operational cycles. Provide non-resetable electric counters for all overhead coiling doors.
3. Electric Operators and Controls:
 - a. Design operators so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.
 - b. Design operators for 100,000 service-free, operating cycles.
 - c. Provide fixtures that are listed and labeled as specified.

B. Definitions:

1. Operating Cycle: One complete cycle of a sectional door or fire-resistance-rated sectional door begins in the closed position. The door is then moved to the open position and back to the closed position.

2.2 MANUFACTURERS

A. Insulated Ribbed Faced Steel Sectional Doors:

1. Products and Manufacturers: Provide one of the following:
 - a. 220/2000 Series by Wayne Dalton Corporation.
 - b. Thermal Sectional Doors TC-200 Series by Raynor Manufacturing Company.
 - c. Or equal.

2.3 DETAILS OF CONSTRUCTION

- A. Construct door sections from cold-rolled, galvanized, structural quality, carbon steel sheets of commercial quality, complying with ASTM A 366/A 366M, and ASTM A 653/A 653M, G 60 zinc coating, mill-phosphatized., with a minimum yield strength of 33,000 psi; designed in conformance with structural performance criteria specified, but not less than 16-gauge, minimum. Provide exterior face as ribbed or fluted sections.

B. Tracks and Supports:

1. Tracks: Provide manufacturer's standard galvanized steel track system, sized for door size and weight, and designed for clearances shown. Provide complete track assembly including brackets, bracing, and reinforcing for rigid support of ball-bearing roller guides, for the required door type and size. Slot vertical sections of track at 2-inches on centers for door drop safety device. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
2. Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members. Secure, reinforce and support tracks as required for size and weight of door to provide strength and rigidity, and to ensure against sag, sway, and detrimental vibration during opening and closing of doors.
3. Support and attach tracks at opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling tracks) with continuous angle welded to track and supported by laterally-braced attachments to overhead structural members at curve and end of tracks.
4. Where sectional door Work requires the built-in of plates, inserts and other items, furnish inserts and anchoring devices, which must be set in concrete or built into masonry for the installation of each type of sectional door.

C. Counterbalancing Mechanisms:

1. Torsion Spring: Hang door assembly for operation by a torsion spring counterbalance mechanism, consisting of adjustable tension, tempered steel

- torsion springs mounted on a case-hardened steel shaft, and connected to door with galvanized aircraft-type lift cable.
2. Provide cast aluminum or grey iron casting cable drums, grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft with one additional mid-point bracket for shafts up to 16 feet-0 inches long and two additional brackets at 1/3 points to support shafts over 16 feet-0 inches long, unless closer spacing is recommended by door manufacturer.
 3. Include a spring-loaded steel or bronze cam mounted to the bottom door roller assembly on each side, designed to stop door automatically if either cable breaks. Provide either a compression spring or leaf spring bumper installed at the end of each horizontal track to cushion door at end of opening operation.
- D. Weather Seals: Provide continuous, rubber or neoprene, adjustable weather-strip gasket at the tops, a compressible astragal on the bottoms of each door and continuous flexible seals at door edges and between panel sections continuously along the meeting edges.
- E. Vision Panels: Except as otherwise shown or specified, furnish 5/8-inch clear insulated sheet glass vision panels in arrangement as shown. Set glass in rubber or neoprene channel strips. Provide removable stops of same materials as door section frames.
- F. Hardware:
1. Provide heavy-duty, rust-resistant hardware, with stainless steel fasteners, as required for type of door.
 2. Hinges: Provide heavy wrought steel hinges at each end stile and at each intermediate stile, as recommended by manufacturer for size of door. 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 only where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16 feet-0 inches in width, unless otherwise recommended by door manufacturer.
 3. Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide roller tires to suit size of track, 3-inch diameter for 3-inch track; 2-inch diameter for 2-inch track, and as follows:
 - a. Case-hardened steel tires, for normal installations.

2.4 ACCESSORIES

- A. Electric Door Operators:
1. General: Furnish electric door operator assembly of the size and capacity recommended and provided by the sectional door manufacturer, complete with electric motor and factory-pre-wired motor controls, including reversing starter, gear reduction unit, solenoid operated brake, clutch,

remote control stations and control devices and wiring complying with the requirements of NFPA 70. Magnetic reversing starter shall be of the internal type with thermal overload protection and reset button.

2. Provide a hand-operated disconnect or mechanism for automatically engaging a sprocket chain operator and releasing brake for emergency manual operation. Mount disconnect and operator so that they are accessible from floor level. Include an interlock device to automatically prevent the motor from operating when emergency sprocket is engaged.
3. Design operator so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.
4. Door Operator Type:
 - a. Provide gear reduction trolley type, with worm and worm gear reduction, enclosed running-in-oil primary drive, and chain or worm gear secondary drive, quick-clutch disconnect-release for manual operation.
5. Electric Motors:
 - a. Provide high-starting torque, reversible, continuous-duty; Class A insulated electric motors, complying with NEMA MG 1, with overload protection.
 - b. Size to start, accelerate, and operate door in either direction, from any position, at not less than 8-inches nor more than 12-inches per second without exceeding nameplate ratings or considering service factor.
 - c. Coordinate wiring requirements and current characteristics of motors with building electrical system; refer to applicable Sections of Division 26, Electrical and other contracts.
 - d. Provide totally enclosed, non-ventilated or fan-cooled motors, waterproof electric motors, fitted with a plugged drain, and controller with NEMA Type 4X enclosure.
 - e. Provide adjustable limit switches, rotary-type, driven by a time chain and interlocked with motor controls set to automatically stop door at fully opened and closed positions. Geared limit switches shall contain a spare set of contacts.
6. Remote Control Station:
 - a. Unless otherwise shown, provide momentary-contact, three-button control stations with pushbutton controls labeled "OPEN", "CLOSE" and "STOP". Install at location as shown or scheduled.
 - b. Provide exterior units, full-guarded type, standard duty, surface-mounted, weatherproof type, NEMA Type 4X enclosure, key-operated.
7. Safety Edge Device:
 - a. Provide each door with a pneumatic safety air switch, extending full width of the door bottom, and located within a U-shaped neoprene or rubber astragal mounted to the bottom door rail.
 - b. Unit shall operate such that contact with the switch before fully closing will immediately change the air chamber pressure sending a signal from the air switch to the electric motor to stop the downward travel and reverse the direction to the fully opened position.

- c. Connect to the control circuit through a retracting safety cord with cable reels provided for each electric operating door.
 - d. The compressible strip shall also serve as a weatherseal along the bottom of the door.
 - e. Safety edge shall be acceptable for use in NFPA 70 Class I, Division 1 locations.
8. Obstruction Detection Devices:
- a. Provide each motorized door with external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - b. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - c. Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to, or disconnection of, sensor device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.

2.5 PAINTING

- A. Shop clean and prime all ferrous metal and galvanized surfaces, exposed and unexposed, except lubricated surfaces, with door manufacturer's standard rust inhibitive primer, drying to a flat sheen.
- B. Refer to Section 09 91 00 Painting, and coordinate compatibility of shop and Site-primed and finished paint for interior and exterior ferrous and non-ferrous metals.

2.6 FABRICATION

- A. Fabricate sections from a single sheet to provide units not more than 24-inches high, and not less than 2-inches deep. Roll horizontal meeting edges to a continuous shiplap, rabbeted, or keyed weather seal, with a reinforcing flange return.
- B. Enclose open section with 16-gauge galvanized steel channel end stiles 2-inches deep, welded in place. Provide intermediate stiles, cut to the door section profile, spaced at not more than 4 foot-0 inches on centers and welded in place.
- C. Reinforce bottom section with a continuous channel or angle conforming to the bottom section profile.
- D. Reinforce sections with continuous horizontal and diagonal reinforcing, as required by door width, and the required structural performance criteria. Provide galvanized steel bars, struts, trusses, or strip steel, formed to the depth, and bolted or welded in place.

- E. Insulate inner face of steel sections with manufacturer's standard glass fiber or polystyrene foam type insulation. Enclose insulation with manufacturer's standard steel sheet secured to door panel.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Contractor shall examine the substrates and conditions under which the sectional doors are to be installed and notify Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 INSTALLATION

- A. Manufacturer's representative shall check and approve the installation before operation. Manufacturer's representative shall field test and calibrate the equipment to assure that the system operates to the Owner's satisfaction.
- B. Install door, track, and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, and hangar and equipment supports in accordance with approved Shop Drawings, manufacturer's instructions and as specified.
- C. Fasten vertical track assembly to framing at not less than 2 foot-0 inches on centers. Hang horizontal track from structural overhead framing with angle or channel hangars, welded and bolt-fastened in place. Provide sway bracing, diagonal bracking, and reinforcing as required for a rigid installation of the track and door operating equipment.
- D. Install, wire, connect and adjust doors, motors, starters, pushbutton stations, limit and safety switches and all other electrical accessories and connections required in full accordance with the manufacturer's written instructions, the approved Shop Drawings, and as shown and specified. Refer to Paragraph 1.1.B. of this Section for the requirements of coordination with others.
- E. Lubricate bearings and sliding parts and adjust mechanism so moving parts operate smoothly and are free from warp, twist, or distortion and are fit watertight for entire perimeter.
- F. Adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- G. Repair damage and replace door components that do not respond to adjustment or lubrication so that door operates smoothly and quietly. Match manufacturer's original finish.

3.3 FIELD QUALITY CONTROL

- A. Upon completion of installation including the Work by other trades, test controls and door operation in presence of Engineer to demonstrate compliance with these Specifications, the manufacturer's design criteria and specified performance criteria.

3.4 MANUFACTURER'S SERVICES

- A. A factory trained representative shall be provided for installation supervision, start-up and test services and operation and maintenance personnel training services. The representative shall make a minimum of two visits, minimum three hours on-Site for each visit, to the Site. The first visit shall be for assistance in the installation of equipment. Subsequent visits shall be for checking the completed installation, start-up, and training. Manufacturer's representative shall test operate the system in the presence of the Engineer and verify that the equipment conforms to the requirements. Representative shall revisit the job Site as often as necessary until all trouble is corrected and the installation is entirely satisfactory.
- B. All costs, including travel, lodging, meals, and incidentals, for additional visits shall be at no additional cost to the Owner.

+ + END OF SECTION + +

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install door hardware. Furnish door hardware for all doors in compliance with these Specifications herein.
2. Extent of door hardware is specified. Door hardware is defined to include all items known commercially as door hardware, except special types of unique and non-matching hardware specified in the same Section as the door and door frame.
3. Types of products required include the following:
 - a. Mortise hinges.
 - b. High-security mortise locksets.
 - c. Panic exit devices.
 - d. Heavy-duty, overhead, surface-mounted, door closers.
 - e. Extra heavy-duty, surface-mounted, overhead holders and stops.
 - f. Flush bolts.
 - g. Cylinders for doors specified in other Sections.
 - h. Coordinators.
 - i. Astragals.
 - j. Dust-proof strikes.
 - k. Push plates and protection armor plate.
 - l. Stripping and seals.
 - m. Thresholds.
 - n. Silencers.
 - o. Miscellaneous items and accessories for a complete installation functioning in compliance with the requirements of governing authorities having jurisdiction at the Site.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with, or before, the door hardware.
2. Notify other contractors in advance of the installation of the door hardware to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the door hardware.
3. Coordinate the Work of other Sections to provide clearances and accurate positioning of recessed or cast-in-place items.

C. Related Sections:

1. Section 10 23 13, Wire Mesh Partitions.

2. Section 13 34 19, Pre-Engineered Metal Buildings.

1.2 REFERENCES

- A. Standards referenced in this Section are listed below:
 1. ANSI A117.1, Accessible and Usable Buildings and Facilities.
 2. ANSI/BHMA A156.1, Butts and Hinges.
 3. ANSI/BHMA A156.3, Exit Devices.
 4. ANSI/BHMA A156.4, Door Controls - Closers.
 5. ANSI/BHMA A156.5, Auxiliary Locks and Associated Products.
 6. ANSI/BHMA A156.6, Architectural Door Trim.
 7. ANSI/BHMA A156.7, Template Hinge Dimensions.
 8. ANSI/BHMA A156.8, Door Controls - Overhead Stops and Holders.
 9. ANSI/BHMA A156.13, Mortise Locks and Latches, Series 1000.
 10. ANSI/BHMA A156.16, American National Standard for Auxiliary Hardware.
 11. ANSI/BHMA A156.18, Hardware - Materials and Finishes.
 12. ANSI/BHMA A156.21, Thresholds.
 13. ANSI/BHMA A156.22, Door Gasketing and Edge Seal Systems.
 14. ANSI/BHMA A156.24, Delayed Egress Locks.
 15. ANSI/BHMA A156.26, Continuous Hinges.
 16. ANSI/DHI A115.1, Preparation of Mortise Locks in 1-3/8-inch and 1-3/4-inch Standard Steel Doors and Frames.
 17. ANSI/NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
 18. ASTM E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
 19. BMHA, Certified Product Directory.
 20. DHI, Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
 21. DHI, Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames.
 22. DHI, Sequencing and Format for the Hardware Schedule.
 23. FF-TT-S-00227,
 24. HMMA 830, Hardware Preparation and Locations for Hollow Metal Doors and Frames.
 25. NIST, U. S. Standard.
 26. NFPA 80, Fire Doors and Fire Windows.
 27. NFPA 101, Life Safety Code.
 28. SDI 109, Hardware for Standard Steel Doors and Frames.
 29. SDI 118, Basic Fire Door Requirements.
 30. UL 10B, Fire Tests of Door Assemblies.
 31. UL 10C, Positive Pressure Fire Tests of Door Assemblies.
 32. UL 305, Panic Hardware.
 33. UL, Building Materials Directory.
 34. UL, List of Inspected Fire Protection Equipment and Material.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Provide door hardware and accessories manufactured by firms specializing in the production of this type of Work and complying with specified standards of ANSI, BHMA, DHI, NFPA, HMMA, SDI and UL.
2. Provide door hardware from manufacturers who are members of BHMA and participate in BHMA certification programs.

B. Installer's Qualifications:

1. The door hardware installer shall have in his employ an architectural hardware consultant. The architectural hardware consultant shall be a member of the Door and Hardware Institute, (DHI), who has passed the DHI certification examine and successfully completed an apprenticeship program. The architectural hardware consultant shall be responsible for preparing door hardware schedules and Shop Drawings and be present at the Site for the purpose of checking and supervising the Work of the installer during the time of installation and adjustment of the door hardware Work, and shall prepare a written field report on status of completed door hardware installation as specified.
2. Submit name and qualifications of the installer to ENGINEER.

C. Architectural Hardware Consultant Qualifications:

1. A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations and electrified door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

D. Component Supply and Compatibility:

1. Finish hardware equipment manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
2. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the finish hardware manufacturer.
3. 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.

E. Testing Agency Qualifications: The independent testing agency shall demonstrate to ENGINEER'S satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated in accordance with ASTM E 329, without delaying the Work.

F. Regulatory Requirements:

1. Provide door hardware for fire-resistance-rated openings in compliance with NFPA 80.

2. Provide only door hardware that has been tested, listed and labeled by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels.
 3. Modify features of door hardware items specified, and provide additional accessories and features as required to meet UL and NFPA requirements, at no additional cost to the OWNER.
 4. Codes: Comply with applicable requirements of codes.
- G. Source Quality Control:
1. Obtain each type of door hardware item from only one manufacturer.
 2. Provide door hardware schedule, for submission to, and for approval by, ENGINEER, prepared in compliance with DHI standards.
 3. Comply with specified BHMA standards.
- H. Requirements of Regulatory Agencies:
1. Provide finish hardware for fire-resistance-rated openings in compliance with NFPA 80.
 2. Provide only finish hardware that has been tested, listed and labeled by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels.
 3. Modify features of finish hardware items specified, and provide additional accessories and features as required to meet UL and NFPA 80 requirements, at no additional cost to the OWNER.
 4. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.
- I. Preconstruction and Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19.13, Preconstruction Conference. In addition to OWNER, CONTRACTOR, and ENGINEER, conference participants shall also include Architectural Hardware Consultant and OWNER's security consultant. Review methods and procedures related to electrified door hardware including, but not limited to, the following:
1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
 2. Review sequence of operation for each type of electrified door hardware.
 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. Review required testing, inspecting, and certifying procedures.
 5. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. OWNER entities responsible for signing off on keying and authorization to allow copies of keys.

- e. Address for delivery of keys.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Copies of the Door Hardware Schedule in the manner and format specified, complying with the actual construction Progress Schedule requirements (for each draft). Include explanation of abbreviations, symbols, and codes used to present scheduled information.
 - 1) Prepare and submit Door Hardware Schedule in compliance with HDI standards.
- b. Based on the door hardware requirements specified, organize the final Door Hardware Schedule into "hardware sets," indicating complete designation of every item required for each door or opening. Furnish initial draft of schedule at the earliest possible date, in order to facilitate the fabrication of other Work (such as hollow metal frames) which may be critical in the Project Schedule. Furnish final draft of schedule after Samples, manufacturer's data sheets, coordination with Shop Drawings for other Work, delivery schedules and similar information have been completed and accepted.
- c. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
- d. Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
- e. Include a separate key schedule, showing clearly how OWNER'S final instructions on keying of locks have been fulfilled.
- f. Door Hardware Schedules are intended for coordination of the Work. Review and acceptance by ENGINEER does not relieve CONTRACTOR of responsibility to fulfill the requirements as shown and specified.

2. Product Data:

- a. Copies of manufacturer's data for each item of door hardware. Include whatever information may be required to show compliance with specified requirements, and include instructions for installation and for maintenance of operating parts and exposed finishes. Include mounting heights and locations for each item of door hardware. Provide ENGINEER with latest complete technical catalogue of all available door hardware manufactured by proposed manufacturers, even if manufacturer specified by ENGINEER is submitted by CONTRACTOR to perform the Work. Furnish templates to fabricators of other Work, which is to receive door hardware.

3. Samples: Submit the following:

- a. Actual unit of each door hardware item specified incorporating all standard and special features and finishes specified, demonstrated and identified by manufacturer's representative to ENGINEER. Samples

shall be presented at time of Shop Drawing submittal, as ENGINEER will not review or approve Shop Drawings without concurrent sample submissions.

- b. Approved samples may be incorporated into the door hardware Work.
- c. ENGINEER'S review will be for appearance and for general compliance with required features. Compliance with all other requirements is the responsibility of CONTRACTOR.

B. Informational Submittals: Submit the following:

- 1. Test and Evaluation Reports:
 - a. Certified independent laboratory test reports for BHMA certification program and certification tests for each type of product specified.
- 2. Site Quality Control Submittals:
 - a. Field Report: Architectural Hardware Consultant's Report.
- 3. Qualifications Statements:
 - a. Installer.

C. Closeout Submittals: Submit the following:

- 1. Operation and Maintenance Documentation: Upon completion of the Work, furnish five copies of detailed maintenance manuals, including the following information:
 - a. Product name and manufacturer.
 - b. Name, address, e-mail address and telephone number of manufacturer and local distributor.
 - c. Detailed procedure for routine maintenance and cleaning.
 - d. Detailed procedures for repairs such as dents, scratches and staining.
 - e. Parts identification manual and maintenance manuals for each piece of door hardware.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

- 1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
- 2. Deliver all items of door hardware in manufacturer's original, undamaged packages, bearing accurate representation of the item within each package.
- 3. Pack each piece of door hardware separately, complete with screws, keying, instructions, and templates, tagged to correspond with items submitted on approved Shop Drawings and as specified.

B. Storage and Protection:

- 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- 2. Provide secure storage area for door hardware items, secured by locks and accessible only to door hardware installer, ENGINEER and CONTRACTOR.
- 3. Store door hardware in manufacturers' original packages.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Items that arrive in a damaged condition shall be removed from the Site and not offered again for acceptance. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

1.6 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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 operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: 3 years from date of Substantial Completion, except as follows:
 - a. Exit Devices: 2 years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.

1.8 MAINTENANCE

- A. Extra Materials
 1. Furnish full-size units of door hardware described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Finish Hardware: One unit of each type of hardware specified.
 - b. Electrical Parts: One unit of each type of hardware specified.
- B. Maintenance Service
 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
 2. Maintenance Service: Beginning at Substantial Completion, provide 6 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 hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria:

1. Where the door, shape, size, fire-resistance-rating, frequency of use, or function of a member receiving door hardware is such as to prevent, or make unsuitable, the types of door hardware specified, furnish similar types having as nearly as practicable the same operation but of type or kind more appropriate to the design intention and requirements of governing authorities having jurisdiction at the Site. Clearly identify and highlight to ENGINEER all such required modifications on Shop Drawings submitted for approval.
2. If door hardware for any location is not specified, provide door hardware equal in design and quality to adjacent door hardware specified for comparable openings at no additional cost to OWNER.
3. Furnish door hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements, as necessary for proper installation and function.
4. Unless otherwise specified, comply with DHI, Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames and Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames.

2.2 DETAILS OF CONSTRUCTION

A. General:

1. Hand of Door: The Drawings show the swing or hand of each door leaf (left, right, reverse bevel, etc.). Furnish each item of door hardware for proper installation and operation of the door swing as shown.
2. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with labels required by governing authorities having jurisdiction at the Site.
3. Base Metals: Produce door hardware units of the basic metal and forming method specified, using the manufacturer's standard metal alloy, composition, temper, and hardness. Do not substitute materials or forming methods for those specified.
4. Fasteners: Manufacture door hardware to conform to published templates, generally prepared for machine screw installation. Do not provide door hardware, which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
5. Furnish screws for installation, with each door hardware item. Provide Phillips flat-head screws except as otherwise specified. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed in surfaces

on other Work, to match the finish of such other Work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

6. Provide fasteners which are compatible with both the unit fastened and the substrate, and which will not cause corrosion or deterioration of door hardware, base material, or fastener.
7. Provide concealed fasteners for door hardware units, which are not exposed when the door is closed, except to the extent no standard manufacturer units of the type specified are available with concealed fasteners. Do not use through bolts for installation where the bolt head or the nut on the opposite face is exposed in other Work under any condition, except where it is not possible to adequately reinforce the Work and use machine screws or concealed fasteners of another standard type to satisfactorily avoid the use of through bolts.
8. Tools for Maintenance: Furnish two complete sets of specialized tools as required for OWNER'S continued adjustment, maintenance, removal, and replacement of door hardware.

2.3 HARDWARE TYPES

A. Mortise Hinges:

1. Templates and Screws: Provide only template-produced units.
2. Base Metal: Except as otherwise specified, fabricate hinges from stainless steel and finish to match the latch and lock set.
3. Number of Hinges: Provide three hinges on each door leaf of less than 60-inches in height; provide one additional hinge for next 30-inches of door height or fraction thereof; provide two additional hinges for each 30-inches, or fraction thereof, for doors above 90-inches tall.
4. Hinge Size: Except as otherwise specified or as required to comply with UL and NFPA, provide hinges of the following sizes:
 - a. Interior Doors:
 - 1) Heavy Use, Maximum 36-Inches Wide: 4-1/2-inch heavy-weight (0.180-inches).
 - b. Exterior Doors, Maximum 36-Inches Wide: 4-1/2-inch heavy-weight (0.180-inch).
5. Types of Hinges: Provide full-mortise type, ball-bearing hinges, swaged for mortise applications, inner leaf beveled, square cornered, unless manufacturer's recommendations indicate that half-mortise, half-surface, full-surface or other type should be used for the frame and door type or condition.
6. Hinge Pins: Except as otherwise specified, provide hinge pins as follows:
 - a. Pins: Stainless steel.
 - b. Exterior Doors: Non-removable pins. Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed.
 - c. Tips: Slope ends of hinge barrel.
7. Conform to ANSI/BHMA A156.7.
8. Comply with UL, List of Inspected Fire Protection Equipment and Materials and NFPA 80 requirements.
9. Products and Manufacturers: Provide one of the following:

- a. FBB 199, FBB 191 by Stanley Commercial Hardware, Division of The Stanley Works.
- b. T4B3386, TB3313 by McKinney Products Company, an ASSA ABLOY Group company.
- c. Or equal.

B. High-Security Mortise Lock Sets:

- 1. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with ADAAG.
- 2. 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.
- 3. Strikes: Provide manufacturer's standard wrought box strike, for each location and use shown. Provide stainless steel curved lip strikes, unless otherwise recommended by manufacturer, finished to match lock or latch set trim.
- 4. Lock Throw: Provide minimum of 3/4-inch anti-friction latch bolt and 1-inch dead bolt throw. Comply with UL requirements for throw of latch bolts and deadbolts on fire-resistance-rated openings.
- 5. Materials: Provide the following features and materials:
 - a. Latch Bolt: Two-piece; mechanical; anti-friction, stainless steel.
 - b. Dead Bolt: One-piece, stainless steel with two enclosed hardened-steel roller armor pins.
 - c. Case: Wrought steel, zinc dichromatized.
 - d. Cylinders: High-security; brass; pick- and drill-resistant; ANSI/BHMA A156.5 - E09211A.
 - e. Armor Front: 8-inches by 1-1/4-inches wide, minimum; steel.
 - f. Escutcheon: 8-inches by 2-1/2-inches wide by 3/16-inches thick, minimum; stainless steel, US 32D.
 - g. Hubs: Sintered steel, copper infiltrated.
 - h. Lever with Stop Pin: Brass, plated to match stainless steel, with additional built-in stop to prevent over-torquing of lever.
 - i. All components shall be of marine quality, wherever possible.
- 6. Backset: 2-3/4-inches.
- 7. Modify specified locks and latches to comply with UL, Building Materials Directory, and List of Inspected Fire Protection Equipment and Materials and NFPA 80 requirements.
- 8. Latches and Locks for Means of Egress Doors: Comply with NFPA 101.
- 9. Electrified Locking Devices: BHMA A156.25.
- 10. Finish: US 32D satin.
- 11. Conform to ANSI/BHMA A156.13, Series 1000, Security Grade 1.
- 12. Products and Manufacturers: Provide one of the following:
 - a. High Security SL8800 Mortise Lockset with Augusta - AUSL Lever Handles and Trim by Yale Commercial Locks and Hardware, an ASSA ABLOY Group company.
 - b. ML2000 Series Mortise Lockset with Newport NSM Lever Handles and Trim by Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company.
 - c. Or equal.

C. Panic Exit Devices:

1. Strikes: Provide manufacturer's standard wrought stainless steel jamb-mounted top latch bolt and bottom latch bolt for each location and use shown to allow independent opening and closing of each leaf of double doors with panic exit devices; complying with UL List of Inspected Fire Protection Equipment and Materials and NFPA 80 requirements.
2. Lock Throws: Provide minimum of 3/4-inch latch bolt throw complying with UL List of Inspected Fire Protection Equipment and Materials and NFPA 80 requirements.
3. Strikes: Provide manufacturer's standard wrought stainless steel jamb-mounted top latch bolt and bottom latch bolt for each location and use shown to allow independent opening and closing of each leaf of double doors with panic exit devices; complying with UL List of Inspected Fire Protection Equipment and Materials and NFPA 80 requirements.
4. Lock Throws: Provide minimum of 3/4-inch latch bolt throw complying with UL List of Inspected Fire Protection Equipment and Materials and NFPA 80 requirements.
5. Provide concealed vertical rod type exit device and mortise type exit devices as specified.
6. Provide the following features and materials:
 - a. Latch Bolt: Two-piece; mechanical; anti-friction, stainless steel.
 - b. Dead Bolt: One-piece, stainless steel with two enclosed hardened-steel roller armor pins.
 - c. Case: Wrought steel, zinc dichromatized.
 - d. Cylinders: High-security; brass; pick- and drill-resistant; ANSI/BHMA A156.5 - E09211A.
 - e. Armor Front: 8-inches by 1-1/4-inches wide, minimum; steel.
 - f. Escutcheon: 8-inches by 2-1/2-inches wide by 3/16-inches thick, minimum; stainless steel, US 32D.
 - g. Hubs: Sintered steel, copper infiltrated.
 - h. Crossbar: Oval, seamless with interlocking expansion collets and roll pins; knurled, satin stainless steel, 0.062-inches minimum thickness, with steel reinforcing tube.
 - i. Concealed bolts: Minimum 1/2-inch diameter, stainless steel.
7. Backset: Provide minimum backset of 2-3/4-inches.
8. Finish: US 32D satin.
9. ANSI/BHMA: A156.3, Type 3 and Type 8, Grade 1; F08, entrance by lever, key locks or unlocks lever for entrances shown as accessible to people with disabilities as required by ADAAG; and F05, entrance by thumb piece, key locks or unlocks thumb piece.
10. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
11. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
12. Products and Manufacturers: Provide one of the following:

- a. 1530-L8 (F) and -T8 (F) Series Mortise Exit Devices and 1520(F) CVR Concealed Vertical Rod Exit Devices; with Escutcheon Trim and Augusta - ASL Lever Handles and Thumbpiece/Handle/Cylinder Unit by Yale Commercial Locks and Hardware, an ASSA ABLOY Group company.
- b. ED6600Series Mortise Exit Devices and ED 6800 Concealed Vertical Rod Exit Devices; with Escutcheon Trim and Newport – N4M Lever Handles and D Grip T7M Thumb piece/Handle/Cylinder Unit by Corbin Russwin Architectural Hardware, an ASSA ABLOY Group company.
- c. Or equal.

D. Cylinders and Keying System:

1. Review the keying system with OWNER'S and provide the type required (master, grandmaster, or great grandmaster), either new or integrated with OWNER'S existing system. Coordinate with Section 10 23 13, Wire Mesh Partitions, to provide separate keying for each cage.
2. Furnish all locks with manufacturer's cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these before Substantial Completion. Construction control keys and cores shall not be part of OWNER'S permanent keying system. Permanent cores and keys shall be furnished to OWNER prior to Substantial Completion.
3. Comply with the OWNER'S instructions for master keying and, except as otherwise specified, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
4. Permanent keys and cores shall be stamped with the applicable key mark for identification. These visual key control marks or codes shall not include the actual key cuts. Permanent keys shall also be stamped "DO NOT DUPLICATE".
5. Cylinder Material: Brass, bronze, or Series 300 stainless steels.
6. Cylinder Features: Seven-pin, high-security, removable core.
7. Key Material: Nickel silver.
8. Key Quantity: Furnish three keys for each lock and five keys for each master and grandmaster system. Provide one extra key blank for each lock.
9. Coordinate cylinder installation with locks furnished in 10 23 13, Wire Mesh Partitions.

E. Overhead, Surface-Mounted, Door Closers:

1. Provide all doors, unless specially shown or specified as being provided with floor-mounted or concealed overhead closers, with surface-mounted overhead door closers. Provide both active and inactive door leafs with closers.
2. Size of Units: Except as otherwise specified, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather, and anticipated frequency of use.
3. Where parallel arms are specified, and for closers on exterior doors, provide closer unit one size larger than recommended for use with standard arms.
4. Use parallel arm arrangement for doors that would otherwise have the door closer appearing in finished corridors or entries.

5. Comply with UL, Building Materials Directory, and List of Inspected Fire Protection Equipment and Materials, and NFPA 80. Modify closers specified as required.
6. Provide hold open feature for all non-fire-resistant-rated doors, unless otherwise specified.
7. Provide corner bracket mounting on exterior doors. Select all arms to clear weather-stripping, and overhead door holders.
8. Provide long arm to allow door to swing 180 degrees where long arm will eliminate floor-mounted stops.
9. Provide closers with spring power adjustment feature capable of increasing spring power 15 percent minimum in all closer sizes.
10. Provide individual regulating valves for closing and latching speeds, and separate adjustable back check valve.
11. Provide delayed closing action feature on all door closers. Position valve at top of closure.
12. Provide the following materials and features:
 - a. Full Metal Cover: Aluminum.
 - b. Case: Cast-iron.
 - c. Arms: Plated to match full metal covers.
 - d. Other Parts: Steel.
 - e. Extreme temperature fluid.
 - f. Security torx machine screws.
 - g. Ten-year warranty.
 - h. Provide manufacturer's optional corrosion protection.
13. Finishes: US 26D satin chrome. Color coordinate all arms and other accessories.
14. Highly Corrosive Atmospheres: Provide all closers with specified manufacturer's optional corrosion protection.
15. ANSI/BHMA: A156.4, C02011, in compliance with PT 1 and PT 4.
16. Products and Manufacturers: Provide one of the following:
 - a. DC8000 Series by Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - b. 4040 Series by LCN Closers, an Ingersoll Rand Company.
 - c. Or equal.

F. Extra Heavy-Duty Overhead Holders and Stops:

1. Provide surface-mounted, extra heavy-duty overhead holders and stops with hold-open feature for doors included in List of Door Hardware Items at end of Part 3.
2. Materials: Provide the following materials:
 - a. Arm: Type 316 stainless steel, 3/4-inch diameter rod minimum.
 - b. All Other Parts: Extruded brass.
3. Coordinate placement of extra heavy-duty overhead holder and stop with weather-stripping for non-interference. Provide angle jamb brackets as required to mount to surfaces encountered in the Work. Coordinate and provide additional drop-brackets for non-interference with overhead closer mounting.

4. Design and reinforce connections of extra heavy-duty holder and stops where they are fastened to other materials, to resist a superimposed load of 30 pounds per square foot acting on the plane of the doors. Mount to door using a minimum of four countersunk mounting holes with four 5/16-inch diameter stainless steel pan head machine screws.
5. Provide all manufacturer recommended door reinforcements and coordinate the furnishing of hardware templates required for the installation of the units.
6. Finish: US 26D satin chrome, except rod shall be US 32D satin.
7. ANSI/BHMA: A156.8, C58511.
8. Products and Manufacturers: Provide one of the following:
 - a. J79H Extra Heavy-Duty Surface-Mounted Overhead Door Holders with J Mounting (as required) by Glynn-Johnson Part of Worldwide Ingersoll-Rand.
 - b. Or equal.

G. Flush Bolts:

1. Provide flush bolts on the inactive leaf of all pairs of doors, unless otherwise specified.
2. Provide flush bolts at the top and bottom of door.
3. Provide downset of 12-inches for all automatic flush bolts, and manufacturers' automatic flush bolt strikes, for the locations specified in List of Door Hardware Items at end of Part 3.
4. Comply with UL, Hardware, Automatic or Surface Bolts, and NFPA 80, for automatic flush bolt requirements.
5. Provide the following features and materials:
 - a. Automatic Flush Bolts: All parts bronze.
 - b. Flush Bolt Levers: Forged Brass.
 - c. Flush Bolt Plate: Forge Brass.
 - d. Flush Bolt Guide and Strike: Wrought Brass.
 - e. Flush Bolt Rods: 1/2-inch round rods, bronze, 12-inches minimum length.
 - f. Bolt Head: Brass.
6. Provide extension flush bolts with 3/4-inch throws and with top bolt not over 6 foot-0 inches above finished floor. Provide bottom flush bolt 12-inches long.
7. ANSI/BHMA: A156.16: L14081, L14251 and L14091.
8. Products and Manufacturers: Provide one of the following:
 - a. FB458 Extension Flush Bolts by IVES Hardware, an Ingersoll-Rand Corporation.
 - b. Trimco 3917 Series Manual Exterior Flush Bolts by Triangle Brass Manufacturing Company.
 - c. Or equal.
9. Where required by governing authorities having jurisdiction at the Site, provide cast bronze automatic flush bolts bearing the UL label.

H. Coordinators:

1. Provide coordinator device on all pairs of doors required or specified to have automatic flush bolts, or panic exit devices. Comply with UL, List of Inspected Fire Protection Equipment and Material, and NFPA 80 requirements.

2. Provide manufacturer's standard units equipped with a safety release mechanism which allows the active leaf to close if under extreme pressure and whose active door lever, located nearest the active door stop, holds the active door ajar until the trigger mechanism is released to the retracted position by the closing of the inactive leaf.
 3. Provide coordination and/or closure at door top to ensure that coordinator does not fall into door top recess or recess for flush bolt.
 4. Materials: Anodized aluminum.
 5. Finish: US 27 satin.
 6. ANSI/BHMA: A156.3, BHMA 5.1, Type 21A.
 7. Products and Manufacturers: Provide one of the following:
 - a. COR7G Series Coordinator with FB Series Flush Bolts by IVES Hardware, an Ingersoll-Rand Company.
 - b. Trimco Series 3094 Coordinator by Triangle Brass Manufacturing Company.
 - c. Or equal.
- I. Astragals:
1. Provide metal astragal bar, not less than 1/8-inch by 2-inches, for exposed flathead screw mounting on active leaf of all pairs of doors. Comply with UL and NFPA requirements for types and locations of astragals.
 2. Provide astragal of cold-rolled steel with prime painted finish.
 3. Provide astragal of extruded aluminum with clear anodized finish.
 4. Products and Manufacturers: Provide one of the following:
 - a. No. 357 Series by Pemko Manufacturing Company.
 - b. No. 139 Series by National Guard Products.
 - c. Or equal.
- J. Dust-Proof Strikes:
1. Provide brass dust-proof strikes, which incorporate a slotted plunger raised to flush position by spring tension for all flush bolts.
 2. Provide 5/8-inch inside diameter dust-proof strikes; threshold mounted and surface mounted.
 3. Finish: US 26D satin chrome.
 4. ANSI/BHMA: A156.16, L14011-L14012.
 5. Products and Manufacturers: Provide one of the following:
 - a. DP-1 and DP-2 by IVES Hardware, an Ingersoll-Rand Company.
 - b. Trimco Series 3910 and 3910N Dustproof Strikes by Triangle Brass Manufacturing Company.
 - c. Or equal.
- K. Push Plates and Protection Armor:
1. Push Plates:
 - a. Provide 0.125-inch thick stainless steel plate with No. 4 finish.
 - b. Size: 8-inches by 16-inches with beveled edges.
 - c. ANSI/BHMA: A156.6, J304; B3E.
 - d. Products and Manufacturers: Provide one of the following:
 - 1) 80S Beveled Push Plates by Hager Companies.

- 2) 8200 Series Push Plates by IVES Hardware, an Ingersoll-Rand Company.
 - 3) Or equal.
2. Protection Armor:
 - a. Provide one armor plate per leaf of each door scheduled to receive armor-plate protection.
 - b. Provide 16-gauge stainless steel with No. 4 finish 2 foot-0 inches high by 12-inches less in width than width of door.
 - c. ANSI/BHMA: A156.6, J101; B3E.
 - d. Products and Manufacturers: Provide one of the following:
 - 1) 193S Beveled Stainless Steel Armor Plates by Hager Companies.
 - 2) 8400 Series Protection Plates by IVES Hardware, an Ingersoll-Rand Company.
 - 3) Or equal.
- L. Weatherstrip Gasketing:
 1. Provide perimeter weather stripping at all exterior doors. Provide stripping and seals for interior doors where scheduled in List of Door Hardware Items at end of Part 3.
 2. Continuity of Stripping: Except as otherwise specified, stripping at each opening shall be continuous and without unnecessary interruptions at door corners and hardware.
 3. Replaceable Seal Strips: Resilient or flexible seal strip of every unit shall be easily replaceable and readily available from stocks maintained by the manufacturer.
 4. Provide bumper-type weather-stripping at jambs and head, including a resilient insert and metal retainer strip, surface-applied, of the following metal, finish and resilient bumper material:
 - a. Housing: Extruded aluminum with clear anodized finish; 0.062-inch minimum thickness of main walls and flanges.
 - b. Dimensions: 1-3/8-inches by 7/8-inches, stop-mounted.
 - c. Seals: Closed-cell extruded silicone.
 - d. ANSI/BHMA: A156.22, R3E264.
 - e. Products and Manufacturers: Provide one of the following:
 - 1) No. 2891 APK (for parallel arms) by Pemko Manufacturing Company.
 - 2) No. 429A (for parallel arms) by Zero International.
 - 3) Or equal.
 5. Provide heavy-duty, surface-mounted, door-bottom sweep unit of manufacturer's standard design retained in an extruded metal bar and capable of closing a 3/4-inch gap (from door bottom to floor or threshold):
 - a. Housing: Extruded aluminum, 0.062inch thick, with mill aluminum finish.
 - b. Seal: Eco-V.
 - c. Mounting: Surface-mounted.
 - d. ANSI/BHMA: A156.22, R3D534.
 - e. Products and Manufacturers: Provide one of the following:
 - i. No. 345AV, on the exterior face of exterior doors, with a No. 321CN on the interior face of exterior doors, by Pemko Manufacturing Company.

ii. Or equal.

M. Thermal Barrier Thresholds:

1. All exterior doors shall be provided with thermal barrier thresholds.
2. Metal: Extruded aluminum.
3. Surface Pattern: Fluted tread, manufacturer's standard.
4. Provide countersunk stainless steel screws and expansion shields.
5. Width: 5 1/8-inches wide and of length sufficient to span full width of rough openings, coped and scribed neatly at and around door frames.
6. Construction:
 - a. Two-piece, with rigid vinyl key complying with manufacturer's recommendations.
7. Profile: Provide manufacturer's unit, which conforms to the minimum size and profile requirements specified.
 - a. For doors equipped with panic hardware, including floor bolts, provide profile with stop bar of proper size and shape to function as the strike plate for the floor bolts.
8. Thickness: 1/2-inch.
9. ANSI/BHMA: A156.21, J12100.
10. Products and Manufacturers: Provide one of the following:
 - a. 252X2AFG by Pemko Manufacturing Company.
 - b. 625 A by Zero International.
 - c. Or equal.

N. Silencers:

1. Provide silencers for all door frames.
2. Provide pneumatic design that, once installed, forms an air pocket to reduce noise.
3. Provide minimum of three per strike side of door jambs.
4. ANSI/BHMA: A156.16, BHMA 6.5, L03011.
5. Products and Manufacturers: Provide one of the following:
 - a. SR64 by IVES Hardware, an Ingersoll-Rand Company.
 - b. Series 307D by Hager Companies.
 - c. Or equal.

O. Sealants: Provide elastomeric sealant complying with FS TT-S-00227, Type 2 (non-sag) Class A for use with thresholds.

2.3 HARDWARE FINISHES

- A. Provide matching finishes for door hardware units at each door or opening, to the greatest extent possible in compliance with ANSI/BHMA A156.18.
- B. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of door hardware exposed at the same door or opening. In general, match all items to the manufacturer's standard finish for the latch and lock set for color and texture.

PART 3 - EXECUTION

3.1 INSPECTION

- A. CONTRACTOR shall examine the substrate to receive door hardware, and the conditions under which the Work will be performed, and notify ENGINEER, in writing, of unsatisfactory conditions. Do not proceed with the door hardware Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 PREPARATION

- A. Templates: Furnish door hardware templates to each fabricator of doors, frames and other Work to be factory-prepared for the installation of door hardware. Check the Shop Drawings of such other Work, to confirm that adequate provisions are made for the proper installation of the door hardware.
- B. Prepare Work to receive door hardware Work in compliance with ANSI/DHI A115.1.
- C. Surface-Applied Door Hardware: NFPA 80: Drill and tap doors and frames according to ANSI A250.6.

3.3 INSTALLATION

- A. Installer shall check and approve the installation before operation. Installer shall assure that the system operates to the OWNER'S satisfaction.
- B. Mount door hardware units at heights recommended in, Door and Hardware Institute, "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames" and "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames", except as otherwise specified or required to comply with governing authorities having jurisdiction at the Site, HMMA 830 and ADAAG requirements.
- C. Install each door hardware item in compliance with the manufacturer's instructions and recommendations and approved Shop Drawings. Wherever cutting and fitting is required to install door hardware onto or into surfaces that are later to be painted or finished in another way, install each item completely, then remove, and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.
- G. Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze or stainless steel that will not corrode in contact with the threshold metal.
- H. Set thresholds in a bead of elastomeric sealant to completely fill concealed voids and exclude moisture from every source. Do not plug drainage holes or block weeps. Remove excess sealant before sealant cures to a firm set.
- I. Initial Adjustment: Adjust and check each operating item of door hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with the type of lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- J. Final Adjustment: Where door hardware installation is made more than one month prior to Substantial Completion, return to the Work during the week prior to acceptance or occupancy, and make a final check and adjustment of all door hardware items in each space and area. Clean and re-lubricate operating items as necessary to restore proper function and finish of door hardware and doors. Adjust door control devices to compensate for final operating of heating and ventilating equipment.
- K. Provide manufacturer's authorized representative to instruct and train OWNER'S personnel in proper adjustment and maintenance of door hardware during the final adjustment of door hardware.
- L. Door hardware, which is blemished or defective, will be rejected even though it was set in place before defects were discovered. Remove and replace with new door hardware. Repair all resultant damage to other Work.
- M. Continued Maintenance Service: Approximately six months after the acceptance of door hardware in each area, the installer, accompanied by the representative of the latch and lock manufacturer, shall return to the Project and re-adjust every item of hardware to restore proper function of doors and door hardware. Consult with and instruct OWNER'S personnel in recommended additions to the maintenance

procedures. Clean and lubricate operational items wherever required. Replace door hardware items that have deteriorated or failed due to faulty design, materials or installation of door hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance or the door hardware.

3.4 FIELD QUALITY CONTROL

- A. Provide a written field report, prepared by installer's architectural hardware consultant, identifying actual condition, location, manufacturer, and product designation for each item of door hardware actually present on each door at the Site, including whether door hardware is adjusted and operating properly, compared with each item referenced to approved Shop Drawings and Contract requirements.
- B. Installer's hardware consultant shall provide opinions to, and assist ENGINEER in determining, acceptability of installation as Work proceeds. All comments and discussions, conversations and meetings with ENGINEER shall be included in written field report for submission to ENGINEER for review and approval at completion of door hardware installation.
- C. As part of written field report to be submitted to ENGINEER for approval, recommend remedial actions for Work not in compliance with these Specifications. No payment for Work shall be made until remedial recommendations and actions have been approved by ENGINEER and incorporated into the Work.

3.5 LIST OF DOOR HARDWARE ITEMS

- A. Scheduled items for each door are generic and rely on information specified above. The listing of hardware functions and types provided are only a general guideline for the final Door Hardware Schedule. CONTRACTOR shall submit a Door Hardware Schedule acceptable to all governing authorities having jurisdiction at the Site.
- B. Provide the following door hardware items – Garage Addition:
 - 1. Hardware Set #1: Door Nos. 100-2, 100-5, 100-6, Exterior, 3'-0"x7'-2", Hollow Metal.
 - 1) Mortise Hinges.
 - 2) Mortise Lock (F04).
 - 3) Panic Exit Device (F05).
 - 4) Overhead, Surface-Mounted Door Closers without hold-open feature.
 - 5) Extra heavy-duty, surface-mounted, overhead holders and stops.
 - 6) Push plates and protection armor plates.
 - 7) Weatherstrip Gasketing.
 - 8) Thermal barrier threshold.
 - 9) Silencers.
 - 2. Hardware Set #2: Door No. 100-4, Interior, Double Hollow Metal Doors:
 - 1) Mortise Hinges.
 - 2) Mortise Lock (F07).
 - 3) Overhead, Surface-Mounted Door Closers with hold-open feature.

- 4) Flush Bolts.
- 5) Coordinator.
- 6) Astragal.
- 7) Dust-proof strikes.
- 8) Weatherstrip Gasketing.
- 9) Threshold.
- 10) Silencers.

+ + END OF SECTION + +

SECTION 08 90 00

LOUVERS AND VENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install all louvers and vents Work.
2. Extent of louvers and vents Work is shown.
3. Types of products required include the following:
 - a. Six-inch fixed, drainable, extruded-aluminum louvers.
 - b. Sill extensions, bird screens, insect screens, and other miscellaneous trim, fasteners, blank-off panels, supports and other accessories.
 - c. Polyvinylidene fluoride finish.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the louvers and vents Work.
2. Verify size, location and placement of louver and vents prior to fabrication, wherever possible. Coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Preassemble units in as large sections as practicable.

C. Related Sections:

1. Section 07 92 00, Joint Sealants.
2. Section 09 91 00, Painting.
3. Section 13 34 19, Pre-Engineered Metal Building.
4. Section 40 05 96, Vibration, Seismic and Wind Controls.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
2. ASCE 7-2002: Minimum Design Loads for Buildings and Other Structures.
3. ASCE/SEI 24-14: Flood Resistant Design and Construction.
4. AMCA Standard 501, Application Manual for Air Louvers.
5. AMCA Standard 500-L, Test Methods for Louvers, Dampers.
6. AMCA Certified Ratings Program.
7. ASTM B 26, Standard Specification for Aluminum-Alloy Sand Castings.

8. ASTM B 209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
9. ASTM B 221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
10. ASTM E 90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
11. ASTM E 329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
12. ASTM E 488, Standard Test Method for Strength of Anchors in Concrete and Masonry Elements.
13. AWS D1.2/D1.2M, Structural Welding Code – Aluminum.
14. AWS D1.3, Structural Welding Code – Sheet Steel.
15. AWS D1.6, Structural Welding Code - Stainless Steel.
16. FEMA FNIP, Technical Bulletin 1, Requirements for Flood Openings in Foundation Walls and Walls of Enclosures.
17. NEMA MG 1 Motors and Generators.
18. SMACNA, Architectural Sheet Metal Manual.
19. UL 1400, Standard for Electric Motors.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.
- C. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Storm-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.
- F. Hurricane-Resistant Louvers: Louvers complying with the Miami- Dade County Product Control Approval System or the Florida Building Code Approval System.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Supplier Qualifications: Supplier shall have a minimum of five years experience producing substantially similar products to those required and shall be able to document at least five installations in satisfactory operation for at least five years.

- B. Performance Criteria: Comply with Sheet Metal and Air Conditioning Contractor's National Association, Architectural Sheet Metal Manual, recommendations for fabrication, construction details, and installation procedures, except as otherwise shown on the Drawings or specified.
- C. Component Supply and Compatibility:
 - 1. Obtain each separate type of louver and vents from a single supplier and from a single manufacturer.
- D. Regulatory Requirements:
 - 1. Miami- Dade County Product Control Approval System or the Florida Building Code Approval System.
- E. Testing Agency Qualifications: The independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated in accordance with ASTM E 329, without delaying the Work.
- F. UL and NEMA Compliance: Provide motors and related components for motor-operated louvers that are listed and labeled by UL and comply with applicable NEMA standards.
- G. AMCA Certified Ratings Seal: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- H. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."
- I. Vibration, Seismic, and Wind Requirements: Contractor responsible for this Section shall provide seismic, vibration, and wind controls for Work specified in this Section, per Section 40 05 96, Vibration, Seismic, and Wind Controls.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following
 - 1. Shop Drawings:
 - a. Include plans, elevations, sections, details, and attachments to other work. Show blade profiles, angles and spacing.
 - 2. Product Data:
 - a. Copies of manufacturer's material specifications, recommended written installation instructions and manufacturer's specifications showing
 - 3. Delegated Design Submittals:

- a. For installed louvers and vents indicated to comply with design loads, include structural analysis data signed and sealed by a Registered Professional Engineer, who is responsible for their preparation.
 - b. Wiring Diagrams: Power, signal, and control wiring for motorized adjustable louvers.
- 4. Samples: For units with factory-applied color finishes.
 - a. Cut-a-way samples of corner section of each type of louver made from 12-inch lengths of full size components and showing the proposed details of joinery, anchorage, movement, glazing, flashing and drainage and with specified finish, prior to fabrication of the Work.
 - 1). Engineer reserves the right to require samples demonstrating design, detailing and fabrication techniques and workmanship for each auxiliary louver component and accessory, before fabrication proceeds.
 - b. Provide polyvinylidene fluoride coating manufacturer's complete color charts showing all colors and finishes, including custom, special, and premium colors, available from the manufacturer.
 - c. Where normal color and texture variations are to be expected, include three or more 12-inch by 12-inch by 1/16-inch aluminum plates, painted as specified, to show the range of such variations. Provide minimum possible color range variation. Engineer reserves the right to reject material finishes with objectionable variations from the established samples.
 - d. Provide anodized finish manufacturer's complete color charts.
 - e. One of each type of fastener employed, with statement of intended use.
 - f. Samples will be reviewed by Engineer for materials, fabrication techniques, proposed system components, workmanship, and color. Compliance with other requirements is the responsibility of Contractor.
- C. Informational Submittals: Submit the following:
 - 1. Certificates: Seismic Qualifications: For louvers, accessories, and components, from manufacturer.
 - 2. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
 - a. Hurricane-Resistant louvers: Laboratory test reports, verifying performance requirements for each type of unit required. Test reports indicating compliance with the Miami-Dade County Product Control Approval System or the Florida Building Code Approval System.
 - b. Acoustical Louvers: Laboratory test reports, verifying performance requirements for each type of unit required. Test reports indicating compliance with ASTM E 90.
 - 3. Source Quality Control Submittals:
 - a. Comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Provide written warranty agreeing to replace louver and vent Work which fails in materials or workmanship within three years of the date of Final Acceptance. Failure of materials or workmanship shall include, but is not limited to, excessive leakage or air infiltration, excessive deflections, deterioration of finish or metal in excess of normal weathering, and defects in accessories, weatherstripping, and other components of the Work.
- B. Guarantee that the polyvinylidene fluoride based coating meets all criteria specified and will not spall, check, craze, peel or otherwise lose adhesion for a period of twenty years from the date of Final Acceptance, to the extent that such shall create unsightly conditions or otherwise impair the intended architectural qualities of the building.
- C. In the event that the polyvinylidene fluoride based coating fails to meet the specified standards, the manufacturer shall, at his own expense, replace or field paint, as directed by Engineer, all areas affected by the failure. In the event that repainting is selected, it shall be done at mutually agreeable intervals throughout the term of the warranty.
- D. The warranty does not apply where failure is caused by accidents, or external conditions or forces beyond the control of the manufacturer.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. Structural Performance: Provide louvers and vents capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.
 - 1. Wind Loads: Determine loads based on a uniform pressure of (--1--) lbf/sq.ft., acting inward or outward.
- B. Seismic Performance: Provide louvers capable of withstanding the effects of earthquake motions determined according to the International Building Code and ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section

9, "Earthquake Loads". Refer Section 40 05 96, Vibration, Seismic and Wind Controls, for more information.

1. Seismic Design Criteria:
 - a. Seismic Risk Category: II.
 - b. Seismic Importance Factor: 1.00.
 - c. Seismic Design Category: B.
 - d. Spectral Response Accelerations:
 - 1) $S_s = 0.164$
 - 2) $S_1 = 0.080$
 - e. Spectral Response Coefficients:
 - 1) $S_{DS} = 0.310g$
 - 2) $S_{D1} = 0.099g$
 - f. Site Class: D.

- C. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 20°F, ambient; 120°F, material surfaces.

2.2 MATERIALS

- A. Aluminum Sheet: ASTM B 209, Alloy 5005 with temper as required for forming or as otherwise recommended by the metal producer to provide the required finish.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T52.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.
- D. Fastenings: Stainless steel. Provide types, gages and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise specified. Use continuous aluminum closure angles on the inside perimeter frame of all louver and vents Work, finished to match louvers and vents.
- E. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to four times the loads imposed, for concrete, or six times the loads imposed, for masonry, as determined by testing conforming to ASTM E 488, conducted by a qualified independent testing agency.
- F. Protection of aluminum from dissimilar materials shall conform to Section 09 91 00, Painting.
- G. Recycled Content, Pre-Consumer:

2. Extruded aluminum: 45 per cent by weight,
3. Fabricated sheet aluminum: 28 per cent by weight,
4. Aluminum bird screen: 38 per cent by weight.

2.3 FABRICATION, GENERAL

- A. Assemble louvers and vents in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes as shown, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 1. Frame Type: Channel, unless otherwise shown and as specified.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Where shown, provide subsills made of same material as louvers.
- F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise shown or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, DRAINABLE, EXTRUDED-ALUMINUM LOUVERS

- A. Furnish six-inch fixed louvers where shown or scheduled. Drainable blades shall incorporate a front lip gutter and recessed second gutter, both of which direct water to jamb and mullion drains.
- B. Free Area Velocity:
 1. 4-inch: Maximum 990 feet per minute free area velocity at a pressure drop of not more than 0.22-inches water gage carrying less than 0.01 ounces of water per square foot of free area.
 2. 6-inch: Maximum 1200 feet per minute free area velocity at a pressure drop of not more than 0.22-inches water gage carrying less than 0.01 ounces of water per square foot of free area.
- C. All blades shall be 0.081-inch thick. Provide all blades with integral drainage trough along edge of blades. Frame shall be 0.081-inches thick. Mullions shall be of the sliding interlock type.
- D. Free Area: For a 48-inch by 48-inch high louver.
 1. 4-inch: 49 percent.
 2. 6-inch: 45 percent.

- E. Install removable screen behind the louver.
- F. Products and Manufacturers: Provide one of the following:
 - 1. No. 6157 by Construction Specialties, Incorporated.
 - 2. No. K6846 by the Airolite Company, LLC.
 - 3. Or equal.

2.5 LOUVER SCREENS

- A. Provide removable screens for all louvers.
- B. Fabricate screen frames of the same metal and finish as the louver units to which secured. Provide frames consisting of extra heavy duty extruded 0.090-inch aluminum for permanently securing screen mesh. Frames shall be rewirable.
- C. Provide bird screen, 1/2-inch square stainless steel wire, 0.047-inch diameter wire.
- D. Locate screens on inside face of louvers. Secure screens to louver frames with machine screws, spaced at each corner and at 12-inches on centers.
- E. Provide minimum No. 8 stainless steel metal screws, unless larger screws are required by screen size.
- F. Provide cross bar screen reinforcement of same material and finish as louver which subdivides screens into maximum area of 50 square feet.

2.6 SILL EXTENSION

- A. Gage and Finish: Same as louver.

2.7 ATTACHMENT FRAME

- A. Gage and Finish: Same as louver.
- B. Size: As shown on the Drawings.

2.8 FINISHES

- A. Anodized Finish:
 - 1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018-mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Contractor and his installer must examine the areas and conditions under which louvers and vents Work and associated items are to be installed and notify Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for the installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate the delivery of such items to the Site.

3.3 INSTALLATION

- A. Locate and place louver units plumb, level and in proper alignment with adjacent work.
- B. Use stainless steel expansion bolt anchors with stainless steel washers and neoprene gaskets. Use spring clips at all anchors to stop deflection of the louver frame. Provide anchors spaced 2 feet-0 inches on centers. Provide continuous aluminum angles for anchoring all operable louvers.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers, as shown.
- D. Repair finishes damaged by cutting, welding, soldering, and grinding operations required for fitting and jointing. Restore finishes and prime coats of paint so that there is no evidence of corrective Work. Return items which cannot be refinished in the field to the shop, make the required alterations, and refinish the entire unit, or provide new units, as determined by Engineer.
- E. Protection of Aluminum from Dissimilar Materials: Coat all aluminum surfaces in contact with dissimilar materials such as concrete, masonry, steel and other metals as specified in Section 09 91 00, Painting.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 92 00, Joint Sealants, for sealants applied during louver installation.

3.4 FIELD QUALITY CONTROL

- A. Determine conformity of louver polyvinylidene fluoride finish to these Specifications, as follows:

1. The manufacturer of the louver and vents shall set aside and label samples of the metal from each production lot for the job. Protect samples from weather.
2. Make sample louver and vent available at all times, for comparison with installed louver and vent Work as requested by Owner, for the full time of the warranty.
3. Make color comparison measurements with a Hunter Tristimulus Color Difference Meter employing methods of computation in use at the National Bureau of Standards conforming to ASTM D 2224.

3.5 ADJUSTMENT AND CLEANING

- A. Set operable louver blades and adjust as needed to produce fully functioning units that comply with requirements.
- B. Test operation of operable louvers and adjust as needed to produce fully functioning units that comply with requirements.
- C. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- D. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- E. Louvers with dents, warps, gouges, or scratches shall be replaced with new louvers, at no additional cost to Owner.

+ + END OF SECTION + +

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install gypsum board assemblies. The Work also includes:
 - a. Providing openings in gypsum board assemblies to accommodate the Work under this and other Sections, and building into gypsum board assemblies all items to be embedded in or penetrate gypsum board assemblies.
 - b. Providing openings in gypsum board assemblies to accommodate work under other contracts and assisting other contractors in building into gypsum board assemblies all items furnished under other contracts to be embedded in or penetrate gypsum board assemblies.
2. Extent of gypsum board assemblies is shown.
3. Types of products required include:
 - a. Various types of interior ceiling gypsum board.
 - b. Joint reinforcement and finish system.
 - c. Auxiliary materials, trim, and fasteners.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before gypsum board assemblies Work.
2. Coordinate furnishing and installing products for maintaining fire-resistance rating of gypsum board assemblies at perimeters and penetrations where built-in and recessed items and transitions with other building components occur in the Work.
3. Notify other contractors in advance of constructing gypsum board assemblies Work to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before gypsum board assemblies Work.

C. Related Sections:

1. Section 07 21 05, Building Insulation.
2. Section 09 22 16, Non-Structural Metal Framing.
3. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ANSI A108.11, Interior Installation of Cementitious Backer Units.
2. ANSI A118.9, Test Methods and Specifications for Cementitious Backer Units.
3. ASTM C11, Terminology Relating to Gypsum and Related Building Materials and Systems.
4. ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C475/C475M, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
6. ASTM C514, Specification for Nails for the Application of Gypsum Board.
7. ASTM C665, Specifications for Mineral Fiber Blanket, Loose-Fill and Spray-Applied Insulation.
8. ASTM C754, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
9. ASTM C834, Specification for Latex Sealants.
10. ASTM C840, Specification for Application and Finishing of Gypsum Board.
11. ASTM C919, Practice for Use of Sealants in Acoustical Applications.
12. ASTM C954, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033-in. (0.84 mm) to 0.112-in (2.84mm) in Thickness.
13. ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs.
14. ASTM C1047, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
15. ASTM C1177/C1177M, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
16. ASTM C1178/C1178M, Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
17. ASTM C1396, Specification for Gypsum Board.
18. ASTM D578, Specification for Glass Fiber Strands.
19. ASTM D3273, Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
20. ASTM D4977, Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion.
21. ASTM D5034, Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).
22. ASTM D5035, Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
23. ASTM D5420, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
24. ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.

25. ASTM E90, Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
26. ASTM E119, Test Methods for Fire Tests of Building Construction and Materials.
27. ASTM E413, Classification for Rating Sound Insulation.
28. ASTM E488, Test Methods for Strength of Anchors in Concrete and Masonry Elements.
29. ASTM E695, Test Method of Measuring Relative Resistance of Wall, Floor and Roof Construction to Impact Loading.
30. GA-214, Recommended Levels of Gypsum Board Finish.
31. GA-216, Application of Gypsum Board.
32. GA-235, Gypsum Board Typical Mechanical and Physical Properties.
33. GA-530, Design Data.
34. UL, Fire Resistance Directory.

1.3 DEFINITIONS AND TERMINOLOGY

- A. Definitions: The following terms are defined for this Section and supplement the terms defined in the General Conditions:
 1. Level of Finish: The designated finish of gypsum board assemblies established in ASTM C840.
- B. Terminology:
 1. Terminology used in this Section is in accordance with ASTM C11, ASTM C754 and ASTM C840.
 2. The following words or terms are not defined but, when used in this Section, have the following meaning:
 - a. “Critical lighting” is strong side lighting from windows or surface-mounted light fixtures.
 - b. “Joint photographing” is the shadowing of finished joint areas through the surface decoration.
 - c. “Drywall primer” is paint material specifically formulated to fill pores and equalize the suction difference between gypsum board surface paper and the compound used on finished joints, angles, fastener heads, and accessories and over skim coats.
 - d. “Skim coat” is thin coat or joint compound, or material manufactured especially for this purpose, applied over the entire surface to fill imperfections in the joint Work, smooth the paper texture, and provide a uniform surface for decorating. Excess compound shall be immediately sheared off, leaving a film of skim coating compound completely covering the paper.
 - e. “Spotting” is to cover fastener heads with joint compound.
 - f. “Texture” is decorative treatment on gypsum board surface.
 - g. “Texturing” is regular or irregular patterns typically produced by applying a mixture of joint compound and water, or proprietary texture materials including latex base texture paint, to a gypsum board surface previously coated with primer/sealer.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
 - a. Provide gypsum board, accessories and trim manufactured by firms specializing in production of types of products specified, in compliance with reference standards listed in this Section.
 - b. Provide gypsum board assemblies manufactured by firms that are members of the Gypsum Association (GA) and participate in GA's certification programs.
2. Installer:
 - a. Engage a single installer that regularly performs gypsum board assemblies installation, with documented skill and successful experience in installing types of materials required; and that employs only tradesmen who are trained, skilled, and have successful experience in installing types of materials specified.
 - b. Submit name and qualifications with the following information for at least three successful projects:
 - 1) Names and telephone numbers of owners, architects or engineers responsible for projects.
 - 2) Approximate contract cost of the gypsum board assemblies.
 - 3) Quantity (area) installed.

B Component Supply and Compatibility:

1. Furnish gypsum board assemblies materials from manufacturers who retains qualified technical personnel who will visit the Site for purpose of advising installer of proper procedures and precautions for using materials and who will assist ENGINEER with opinions on whether gypsum board assemblies Work conforms to the Contract Documents and manufacturer's recommendations.
2. Provide gypsum board assemblies materials from manufacturer who furnishes test certificates for published fire, sound, and structural data covering systems designed and constructed according to manufacturer's published specifications.
3. Furnish gypsum board assemblies materials from manufacturers whose products comply with GA-235.

C. Mock-Ups:

1. Before proceeding with purchasing materials and installing gypsum board assemblies and after ENGINEER's approval of Samples and other submittals, install 100 square foot Samples of each type of gypsum board assembly, including accessory trim, framing specified in Section 09 22 16, Non-Structural Metal Framing, insulation specified in Section 07 21 05, Building Insulation, built-in items that may be specified in other Sections, as applicable, and Section 09 91 00, Painting, and decorative finishes specified in this Section indicating the final relationship and configurations of various parts and components and quality of workmanship to be achieved in the

- Work. Locate mock-ups in areas selected by ENGINEER to indicate representative installation of each type of gypsum board assembly.
2. Simulate finished lighting conditions for mock-up review.
 3. Incorporate materials and methods of installation that are identical to Project requirements.
 4. Obtain ENGINEER's approval of visual qualities of mock-up before starting installation of gypsum board assemblies. Retain and protect mock-up during construction as a standard for judging completed gypsum board assemblies Work. Do not alter or remove approved mock-ups.
 5. Build as many mock-ups as required to obtain ENGINEER's approval. Disassemble rejected mock-ups and remove components from the Site. Do not incorporate rejected mock-up components into the Work. Approved mock-up may be incorporated into the Work.
 6. Do not commence gypsum board assemblies installation without obtaining ENGINEER's approval of associated mock-up.
 7. Remove and replace with new material gypsum board assemblies that do not meet standard of workmanship on the approved mock-up.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Show locations, fabrications, and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other units of Work.
2. Product Data:
 - a. Manufacturer's product data, specifications, and performance data for gypsum board assembly component required. Indicate compliance with requirements of reference standards included in this Section and requirements of authorities having jurisdiction.
 - b. Include copies of certified test reports and other data as may be required to show compliance with the Contract Documents, including specified performance characteristics and physical properties.
 - c. Manufacturer's design criteria for transverse loading capabilities of system assemblies indicating compliance with requirements of authorities having jurisdiction at the Site, for unbraced supported partition heights shown and system performance criteria specified.
3. Samples: Sample submittals will be reviewed by ENGINEER for color, texture, and pattern only. Compliance with all other requirements is the responsibility of CONTRACTOR. Submit the following:
 - a. Full-size Sample, each 12-inch long, for each trim accessory used in the Work.
 - b. Mock-up(s).

B. Informational Submittals: Submit the following:

1. Certificates.
 - a. Certificates signed by manufacturer stating that materials meet or exceed requirements of the Contract Documents, including

- performance characteristics and criteria and physical requirements, thickness requirements, and application requirements.
- 2. Supplier Instructions:
 - a. Step-by-step joint treatment installation instructions for each Level of Finish specified for each area of the Work.
- 3. Site Quality Control Submittals:
 - a. Results of specified inspections and observations.
- 4. Qualifications Statements:
 - a. Manufacturer, when required by ENGINEER.
 - b. Installer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Comply with applicable requirements of reference standards used in this Section, Section 01 65 00, Product Delivery Requirements, and Section 01 66 00, Product Storage and Handling Requirements

1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Temperature: Comply with the more stringent of ASTM C840 and manufacturer's written recommendations.
 - 2. Ventilation:
 - a. Provide ventilation during and following application of adhesives and joint treatments.
 - b. Use temporary air circulators in enclosed areas that lack natural ventilation.
 - c. Under slow drying conditions, allow additional drying time between coats of joint treatment.
 - d. Protect installed materials from drafts during hot, dry weather.
 - 3. Do not install panels that are any of the following: wet, moisture damaged, or mold damaged.
 - a. Indications that panels are wet or moisture damaged includes, but is not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.8 SEQUENCING

- A. Prior to starting installation of gypsum board, coordinate Work requiring openings, chases, frames, access panels, support, and similar integrated requirements, including heating and ventilating and electrical work.
- B. Do not proceed with gypsum board installation until blocking, framing, bracing, and other supports for subsequently applied Work are installed.
- C. Do not install gypsum board until thermal insulation to be concealed by board has been installed.

- D. Install sound attenuation blankets where indicated and where required to achieve STC ratings or fire-resistance ratings, before installing gypsum board, unless blankets can be readily installed after board has been installed.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Description:
 - 1. Gypsum board assemblies include finishing systems for ceilings that consists of panels with various types of specially treated, hydrated calcium sulfate cores reinforced with paper laminated to both faces of panels and manufactured for direct application of decorative finishes, including a joint treatment system known as self-setting drywall finishing and other drywall trim system accessories, and a system of metal studs, furring and bracing.
 - 2. Complete systems shall conform to combined performance criteria in the Contract Documents.
 - 3. Recycled Content: Provide gypsum panel products with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes minimum of:
 - a. Gypsum: 25 percent by weight.
 - b. Paper: 100 percent.
 - 4. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Performance Criteria:
 - 1. General:
 - a. Standards: Comply with GA-530 and ASTM standards specified in this Section, except when more-stringent requirements are mandated by authorities having jurisdiction.
 - 2. Level of Finish for Gypsum Board Assemblies: In accordance with ASTM C840, provide the Level of Finish for all gypsum board assemblies indicated in Paragraph 3.6.A.5 of this Section.

2.2 MANUFACTURERS

- A. Gypsum Board Products, Accessories and Trim: Provide products as manufactured by one of the following:
 - 1. Gold Bond Building Products, by National Gypsum Company.
 - 2. ToughRock Products, by G-P Gypsum Corporation.
 - 3. SHEETROCK Brand Products, by United States Gypsum Company, Subsidiary of USG Corporation.
 - 4. Or equal.
- B. Metal Support System Components: Refer to Section 09 22 16, Non-Structural Metal Framing.

2.3 INTERIOR GYPSUM BOARD

- A. Exposed Gypsum Board: Provide the following types of interior gypsum board with two edge configurations where available from manufacturers specified; with 100 percent recycled paper on front, back, and long edges bonded to the core; complying with ASTM C1396:
 - 1. Panel Size: Provide all panels in maximum lengths and widths available that minimize joints in each area and correspond with spacing of support system components.
 - 2. Surface Burning Characteristics, ASTM E84: Flame Spread: 15, Smoke Development: Zero.
 - 3. Moisture and Mold-Resistant Gypsum Board: Gypsum core wall panel with additives to enhance the mold and water resistance of the core; surfaced with moisture/mold resistant paper on front, back and long edges; ASTM C1396 (Section 5).
 - a. Mold and Mildew Resistance: Panel score of 10, when tested in accordance with ASTM D3273.
 - 4. Thickness: 5/8-inch.
 - 5. Long-Edge Profile: Tapered.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475.
- B. High-Strength Joint Reinforcing Tape for Exterior and Interior Applications: Fiberglass, self-adhering, two inches wide, in compliance with ASTM D578, ASTM D5034, and ASTM D5035.
- C. Joint Compound for Exterior and Interior Applications: Provide dry-powder, sandable, self-setting chemical hardening compounds for all gypsum board assemblies Work, recommended by manufacturer as being unaffected by humidity after hardening and drying.
 - 1. For each coat use formulation compatible with other compounds applied previously, and compatible with successive coats.
 - 2. Provide special chemical-hardening-type, slow-setting, or regular-setting-type compounds for gypsum board assemblies.
 - a. Prefilling: At open joints, rounded panel edges, and damaged surface areas, use setting-type taping compound.
 - b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges use setting-type taping compound.
 - c. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - d. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - e. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.5 TRIM ACCESSORIES

- A. General: Comply with ASTM C1047.
- B. Products: Provide manufacturer's standard trim accessories of types shown or indicated for gypsum board assemblies, formed of hot-dipped galvanized steel or zinc, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, J-type wallboard casings and one-piece control joint beads.
 - 1. Finishing Type: Manufacturer's standard trim units to be finished with joint compound.

2.6 GYPSUM BOARD FASTENERS

- A. Gypsum Board Fasteners: Comply with GA-216, and with gypsum board manufacturer's recommendations; choice is installer's option where more than one type is recommended for application specified.
 - 1. Steel Drill Screws: Self-drilling, self-tapping, bugle-head complying with ASTM C954 and ASTM C1002, for use with power-driven tools.
 - a. Type S for wallboard to sheet metal.

2.7 AUXILIARY MATERIALS

- A. Thermal Insulation: Refer to Section 07 21 05, Building Insulation.
- B. Vapor Barrier: Refer to Section 07 21 05, Building Insulation.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrates and spaces to receive gypsum board assemblies, and conditions under which gypsum board assemblies will be installed, and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Verify that spacing of installed, non-load-bearing steel framing does not exceed maximum allowable for types of gypsum board assemblies approved for the Work.
- B. Verify that doorframes are set for thicknesses of gypsum board shown on approved Shop Drawings and in the Contract Documents.

- C. Repair protrusions of framing, twisted framing members, and unaligned members before commencing gypsum board installation.
- D. Protect adjacent surfaces against damage and stains.

3.3 INSTALLATION OF METAL SUPPORT SYSTEMS

- A. Refer to Section 09 22 16, Non-Structural Metal Framing.

3.4 INSTALLATION OF GYPSUM BOARD

- A. General:
 - 1. Standards: Comply with ASTM C840. Comply with requirements for fire resistance-ratings and STC-ratings shown.
 - 2. Provide sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
 - 3. Provide ceiling board 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.
 - 4. Provide gypsum panels with face side out. Butt panels together for light contact at edges and ends with not more than 1/16-inch of open space between panels. Do not force into place.
 - 5. 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. Do not make joint other than control joints at corners or framed openings.
 - 6. Attach gypsum board to steel studs and blocking so leading edge or end of panel is attached to open (unsupported) edges of stud flanges first.
 - 7. Attach gypsum panels to framing provided at openings and cutouts.
 - 8. Cut back paper; do not tear or snap.
 - 9. Control Joints: Form control joints and expansion joints with 1/2-inch continuous opening between edges of adjacent boards for insertion of control joint trim accessory. Provide control joints as shown; if not otherwise shown or indicated, provide at the following locations:
 - a. Ceilings:
 - 1) Areas exceeding 2,500 square feet.
 - 2) Not more than 50 feet on centers.
 - 3) Where ceiling framing or furring changes direction.
 - 4) In furred assemblies where control joints occur in structural ceiling.
 - 5) Where expansion joints occur in steel framing.
 - b. Do not locate joints within eight inches of corners or openings, except where control joints are shown at jamb lines or where openings occur adjacent to corners in partition/wall layout. Where necessary, provide a single vertical joint over center of wide openings.
 - 10. Provide perimeter isolation where non-load-bearing partitions abut structural decks or ceilings, or vertical structural elements. Allow not less than 1/4-inch, or more than 1/2-inch gap between gypsum and structure.

Finish edges of face layer with J-Type (semi-finishing) casing bead. Seal space between casing bead and structure with continuous acoustical sealant bead. Attach gypsum board to studs not less than 1/2-inch below bottom edge of ceiling track flanges and to first stud adjacent to vertical tracks. Do not attach board directly to tracks.

- B. Space fasteners in gypsum panels according to manufacturer's written recommendations and reference standards used in this Section.
 - 1. Space screws maximum of 12 inches on centers for vertical applications.
 - 2. Space fasteners in panels that are ceramic tile substrates a maximum of eight inches on centers.
- C. Panel Installation Methods:
 - 1. General: In addition to complying with reference standards used in this Section, comply with specific requirements indicated for each type or arrangement of gypsum board assembly shown.
 - 2. Single-Layer Applications:
 - a. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible, and at right angles to framing, unless otherwise shown or indicated.
 - b. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise shown or required by fire-resistance-rated assembly, and minimize end joints.
 - 1) Stagger abutting end joints not less than one framing member in alternative courses of board.
 - 2) At stairwells and other high walls, provide panels horizontally (perpendicular to framing), unless otherwise shown or required by fire-resistance-rated assembly.
 - c. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate end joints over furring members.
 - d. For parallel applications, locate edge joints over supports; for right angle applications, stagger end joints over supports.
 - e. Apply gypsum panels to supports with steel drill screws.
 - 3. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
- D. Allowable Tolerances:
 - 1. Gypsum Board Faces: 1/8-inch offsets between planes of board faces, and 1/4-inch in eight feet for plumb, level, warp, and bow.

3.5 INSTALLATION OF TRIM ACCESSORIES

- A. General: Provide trim accessories in accordance with ASTM C840. Coordinate, and integrate where possible installation of trim accessories with installation of gypsum board. Use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports. Otherwise, fasten flanges by nailing in accordance with manufacturer's written instructions.

- B. Install metal corner beads at external corners of gypsum board assemblies.
- C. Install metal edge trim where edge of gypsum board would otherwise be exposed or semi-exposed.
 - 1. Provide U-Type trim-beads, for joint compound, where edge is not tightly fitted to abutting Work, or is exposed, revealed with sealant pocket, gasketed, or with other separation, except as otherwise shown.
 - a. Provide special kerf-type I-trim where adjoining Work is kerfed to receive leg of trim unit.
- D. Install control joint bead units where control joints are shown.
- E. Miter corners of exposed molding and trim (semi-finishing) units. Align joints and support to eliminate offsets.

3.6 FINISHING OF GYPSUM BOARD ASSEMBLIES

- A. General:
 - 1. Comply with GA-214 and finishing materials manufacturer's written instructions for mixing, handling, and applying materials. Machine- or hand-application is installer's option.
 - 2. Apply treatment at joints in both directions, flanges of trim accessories, but not semi-finishing types, gypsum board penetrations, electrical boxes, piping and similar work, fastener heads, surface defects, and elsewhere as shown or specified. Apply in manner that will result in each of these being concealed when applied decoration has been completed.
 - 3. Where open joints of more than 1/16-inch occur, including edges of boards with rounded or beveled corners, prefill joint with chemical-hardening-type bedding compound, prior to bedding of joint tape.
 - 4. Apply joint tape at joints between gypsum boards, except where trim accessory is shown.
 - 5. Level of Finish for Gypsum Board: As established by ASTM C840, provide the following Level of Finish for all gypsum board assemblies:
 - a. Level 2: All joints and interior angles shall have tape embedded in joint compound and wiped with joint knife leaving a thin coating of joint compound over joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at time of tape embedment shall be considered separate coat of joint compound and will satisfy the conditions of this Level. Provide for the following areas:
 - 1) Sprinkler BFP Closet 102; Ceiling.

3.7 FIELD QUALITY CONTROL

- A. Before installing gypsum board ceilings, inspect ceiling support framing accompanied by ENGINEER and submit written report of deficiencies. Do not proceed with installing gypsum board on ceiling support framing until deficiencies are corrected.

3.8 ADJUSTING AND CLEANING

- A. Nail Pop:
 - 1. Repair nail pop by driving new screws approximately 1.5 inches from popped screw and reseal screw.
 - 2. When face paper is punctured, drive new screw approximately 1.5 inches from defective fastening and remove defective fastening.
 - 3. Fill damaged surface with self-setting joint filler compound.
- B. Ridging:
 - 1. Do not repair ridging until condition has fully developed, approximately six months after installation or one heating season.
 - 2. Sand ridges to reinforcing tape without cutting through tape.
 - 3. Fill concave areas on both sides of ridge with topping compound.
 - 4. After fill is dry, blend in topping compound over repaired area. Fill cracks with compound and finish smooth and flush.
 - 5. Installer shall advise CONTRACTOR, who shall advise ENGINEER, of required procedures for protecting completed gypsum board assemblies from damage and deterioration during remainder of construction. CONTRACTOR shall provide required protection.

+ + END OF SECTION + +

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, professional services, and incidentals as shown, specified, and required to furnish and install non-structural metal framing. The Work also includes:
 - a. Providing openings in non-structural metal framing to accommodate the Work under other Sections and building into non-structural metal framing items such as sleeves, anchorage devices, inserts, and all other items to be embedded in non-structural metal framing for which placement is not specifically provided under other Sections.
 - b. Providing openings in non-structural metal framing to accommodate work under other contracts and assisting other contractors in building into non-structural metal framing items such as sleeves, anchorage devices, inserts, and all other items required to be embedded in non-structural metal framing under other contracts.
2. Provide the following types of products:
 - a. Runner channel ceiling suspension systems.
 - b. Interior steel stud partition systems.
 - d. Furring members.
 - e. Auxiliary products.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before non-structural metal framing Work.
2. Coordinate furnishing and installing products for maintaining fire-resistance rating of non-structural metal framing at perimeters and penetrations where built-in and recessed items, and transitions with other building components, occur in the Work.
3. Notify other contractors in advance of constructing non-structural metal framing Work to provide them with sufficient time for installing items included in their contracts to be installed with or before non-structural metal framing Work.

C. Related Sections:

1. Section 09 21 16, Gypsum Board Assemblies.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. ASTM A366/A366M, Specification for Commercial Steel Sheet, Carbon (0.15 Maximum Percent), Cold-Rolled.
3. ASTM A510, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
4. ASTM A570/A570M, Specification for Structural Steel, Sheet and Strip, Carbon, Hot-Rolled.
5. ASTM A641/A641M, Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
6. ASTM A645/A645M, Specification for Pressure Vessel Plates, Five Percent Nickel Alloy Steel, Specially Heat Treated
7. ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM C645, Specification for Nonstructural Steel Framing Members.
9. ASTM C754, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
10. ASTM C840, Specification for Applying and Finishing Gypsum Board.
11. ASTM C841, Specification for Installation of Interior Lathing and Furring.
12. ASTM C955, Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
13. ASTM C1063, Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
14. ASTM D226, Specification for Asphalt-saturated Organic Felt Used in Roofing and Waterproofing.
15. ASTM E90, Test Methods for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
16. ASTM E119, Test Methods for Fire Tests of Building Construction and Materials.
17. ASTM E413, Classification for Rating Sound Insulation.
18. ASTM E488, Test Methods for Strength of Anchors in Concrete and Masonry Elements.
19. ISO 9002, Quality Systems – Model for Quality Assurance in Production, Installation and Servicing.
20. UL, Fire Resistance Directory.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
 - a. Provide non-structural metal framing, furring and auxiliary products and accessories manufactured by firms specializing in producing types of products specified, in compliance with the Contract Documents.

- b. Provide non-structural metal framing, furring and auxiliary products and accessories manufactured by firms that are members of ML/SFA and AWCI, and participate in certification programs.
 - c. Obtain materials from manufacturers who will, when required, furnish services of qualified technical representative at the Site, for purpose of advising installer of proper procedures and precautions for using the materials.
 - d. Provide products from manufacturers who participate in ISO 9002 Quality Control Programs.
2. Professional Engineer:
- a. Engage a registered professional engineer legally qualified to practice in the jurisdiction where the Site is located and experienced in providing engineering services of the kind indicated.
 - b. Submit qualifications data.
 - c. Responsibilities include but are not necessarily limited to:
 - 1) Carefully reviewing non-structural metal framing performance and design criteria stated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to ENGINEER by CONTRACTOR.
 - 3) Preparing or supervising preparation of design calculations and related drawings, Shop Drawings, interpretation of quality control results, and a comprehensive engineering analysis verifying compliance of the non-structural metal framing with the requirements of the Contract Documents.
 - 4) Signing and sealing all calculations and design drawings, and Shop Drawings.
 - 5) Certifying that:
 - a) It has performed the design of the non-structural metal framing in accordance with performance and design criteria stated in the Contract Documents, and the said design conforms to Laws and Regulations, and to the prevailing standards of practice.
3. Installer:
- a. Engage a single installer regularly performing non-structural metal framing and furring installation, and with documented skill and successful experience in installing types of materials required; and who employs only tradesmen who are trained, skilled, and have successful experience in installing types of materials specified.
 - b. Submit name and qualifications with the following information for at least three successful projects:
 - 1) Names and telephone numbers of owners, architects or engineers responsible for each project.
 - 2) Approximate contract cost of non-load-bearing steel framing.
 - 3) Quantity (area) installed.

B. Component Supply and Compatibility:

- 1. Furnish all components of non-structural metal framing and furring from a single manufacturer, and from a single supplier, where possible, with

adequate resources to provide products of consistent performance characteristics, physical properties and appearance, without delaying the Work.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Drawings locating all hangers and support anchors for suspension. Include locations of all accessories and framing components; and location of control joints based on the Contract Documents.
2. Product Data:
 - a. Manufacturer's product data and specifications for each item and each system specified.
 - b. Test Reports: Certified test reports on materials identical to those to be furnished demonstrating compliance with specified performance characteristics and physical properties
 - c. Include reports and other data as may be required to show compliance with the Contract Documents.
3. Delegated Design Submittals:
 - a. Calculations for complete structural analysis of non-structural metal framing systems including calculations showing compliance with system performance criteria specified. Calculations shall be signed and sealed by professional engineer. Professional engineer's seal shall be clearly legible, including state of registration, registration number, and name on seal.
4. Samples:
 - a. Twelve-inch lengths of non-load-bearing steel framing.
 - b. Each type of insert or attachment device.

B. Informational Submittals: Submit the following:

1. Certificates.
 - a. Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.
2. Supplier Instructions:
 - a. Manufacturer's installation instructions for each material specified
3. Site Quality Control Submittals:
 - a. Results of inspection upon completion of installation.
4. Qualifications Statements:
 - a. Manufacturer, when required by ENGINEER.
 - b. Professional engineer.
 - c. Installer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Non-Structural Metal Framing Components and Accessories: Provide products of one of the following:
1. Dietrich Metal Framing, Inc.
 2. Marino\Ware, Division of Ware Industries, Inc.
 3. Or equal.

2.2 MATERIALS

- A. General:
1. Manufacturer's Recommendations: Except where otherwise required to comply with requirements of authorities having jurisdiction or where more stringent requirements are shown or specified, provide type, weight, grade and finish of materials recommended by manufacturer, and include for each system clips, fasteners, ties, reinforcing, stiffeners, shoes, tracks, hangers, brackets, anchors, trim, and accessories as recommended by manufacturer for the application shown or indicated.
 2. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
 3. Metal and Finishes: Manufacturer's standard for steel products, unless otherwise shown or indicated as solid zinc alloy or other metal. Provide manufacturer's standard galvanized finish on steel products.
- B. Ceiling Framing Materials:
1. Steel Joists: Depth as required, cold-rolled commercial quality steel channels, minimum base metal thickness as required, complying with ASTM A645.
- C. Auxiliary Products and Trim:
1. General: Provide auxiliary materials that comply with installation requirements in the Contract Documents.
 - a. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
 2. Isolation Strip at Exterior Walls: Provide one of the following:
 - a. Asphalt-Saturated Organic Felt: ASTM D226, Type I No. 15 asphalt felt.
 - b. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8-inch thick, in width to suit steel stud size.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrates and conditions under which non-structural metal framing Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Anchorages: Coordinate Work with structural ceiling Work to ensure that inserts and other structural anchorage provisions are installed to receive hangers.
- B. Maintain environmental conditions, including temperature, humidity, and ventilation, within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

3.3 INSTALLATION, GENERAL

- A. General: Comply with ASTM C754, except where framing sizes and spacing are indicated in the Contract Documents.
 - 1. Gypsum Board Assemblies: Comply with ASTM C840 relative to framing installation.
- B. Allowable Tolerances:
 - 1. For flat surfaces, do not exceed 1/8-inch in twelve feet for bow, warp, plumb and level.
- C. Isolation: Where non-structural metal framing system abuts building structure horizontally, and where partitions abut overhead structure, isolate the Work from structural movement sufficiently to prevent transfer of loading into non-structural metal framing and support framing from the building structure. Install slip or cushion type joints to absorb deflections but maintain lateral support.
 - 1. Frame both sides of control and expansion joints independently, and do not bridge joints with non-structural metal framing or auxiliary system components.
 - 2. Locations: Provide control joints as shown or, if not shown or indicated, at the following locations:
 - a. Walls and Ceilings:
 - 1) Where framing and furred assemblies cross expansion joints in substrates.
- D. Fixture Support Framing: Install supplementary framing, blocking, and bracing where non-structural metal framing Work is shown or indicated, to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar Work requiring attachment and support.

3.4 AUXILIARY STEEL STUD SYSTEM COMPONENTS

- A. Anchor each flange of auxiliary non-structural metal framing system components to plaster base eight inches on centers.
- B. Miter or cope accessory corners, and install with tight joints accurately aligned.
- C. Install prefabricated control joints of one-piece design, where shown or indicated as control joint.
- D. Install prefabricated expansion joints of two-piece design, where shown or indicated as expansion joint, 1/4-inch joint width for interior Work, 3/8-inch for exterior Work.

3.5 FIELD QUALITY CONTROL

- A. Before installing non-structural metal framing ceilings, inspect deck accompanied by ENGINEER and prepare written report of deficiencies. Do not proceed with installation of non-structural metal framing until defective Work is corrected.
 - 1. Notify ENGINEER at least ten days in advance of date and time when Work, or part of Work, will be ready for above ceiling observation.
 - 2. Before notifying ENGINEER, complete the following in areas to receive non-load-bearing steel framing ceilings:
 - a. Installation of insulation, and successful testing of piping conveying fluids and automatic fire suppression system.
 - b. Installation of air distribution devices.
- B. Special Inspections: Coordinate with the Coordinating Special Inspector. Refer to Section 01 45 33.00, Code-Required Special Inspections, for detailed requirements.

3.6 ADJUSTING AND REPAIR

- A. Cut, repair, and align non-structural metal framing Work as required and as necessary to accommodate other work. Repair bent and dented members. Repair or replace the Work as necessary to comply with specified tolerances.

3.7 CLEANING

- A. Remove temporary covering and other provisions made to minimize debris on other work. Repair surfaces that have been stained, marred or otherwise damaged during non-structural metal framing Work. When Work is completed, remove unused materials, containers, and equipment and debris.

3.8 RELATED WORK

- A. Gypsum Board Installation: Refer to Section 09 21 16, Gypsum Board Assemblies.

3.9 PROTECTION OF EXECUTED WORK

- A. Provide adequate precautions for protecting non-structural metal framing Work from deterioration and damage during remainder of construction.

+ + END OF SECTION + +

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and apply paint systems.
 - a. CONTRACTOR is responsible for surface preparation and painting of all new and existing interior and exterior items and surfaces throughout the Project areas included in the general contract and other contracts described in this Section.
2. Extent of painting includes the Work specified below. Painting shown in schedules may not provide CONTRACTOR with complete indication of all painting Work. Refer to Article 2.2 of this Section where all surfaces of generic types specified are specified for preparation and painting according to their status, intended function, and location, using the painting system for that surface, function, and location as specified, unless specifically identified on the Drawings as a surface not to receive specified painting system.
 - a. All new and specifically identified existing surfaces and items except where the natural finish of the material is specified as a corrosion-resistant material not requiring paint; or is specifically indicated in the Contract Documents as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint them the same as adjacent similar materials or areas.
 - b. Mechanical and process items to be painted include:
 - 1) Piping, pipe insulation, pipe hangers, and supports, including electrical conduit.
 - 2) Heat exchangers.
 - 3) Tanks.
 - 4) Ductwork and insulation.
 - 5) Motors, mechanical equipment, and supports.
 - 6) Accessory items.
 - c. Surface preparation and painting of all new and specifically identified existing items, both interior and exterior, and other surfaces, including items furnished by OWNER, are included in the Work, except as otherwise shown or specified.
 - d. Removal of all substances, top coats, primers, and all intermediate coats of paint and other protective or decorative coatings on those items and surfaces to remain that are identified to receive a painting system under this Section, to provide surfaces acceptable for application of painting specified.
 - e. Approved stepped-down mock-ups for all painting systems showing all components of the surface preparation and paint system application before

start of Work. Check all dry film thicknesses; demonstrate methods of surface preparation, and methods of application, and obtain ENGINEER's approval of colors and textures to be used in the Work.

B. Coordination:

1. Review installation, removal, and demolition procedures under other Sections and coordinate them with the Work specified in this Section.
2. Notify other contractors in advance of the surface preparation and painting Work included in this Section to provide them sufficient time for installation, removal, demolition, and coordination of interrelated items that are included in their contracts and that must be installed, removed, or demolished in coordination with the painting Work.
3. Coordinate painting of areas that will become inaccessible once equipment, laboratory furniture, lockers and similar fixed items have been installed.
4. Coordinate primers with finish paint materials to provide primers that are compatible with finish paint materials. Review other Sections and other contracts where primed surfaces are provided, to ensure compatibility of total painting system for each surface. CONTRACTOR is responsible for coordinating compatibility of all shop primed and field painted items in other Sections and in general contract and other contracts.
5. Furnish information to ENGINEER on characteristics of finish materials proposed for use and ensure compatibility with prime coats used. Provide barrier coats over incompatible primers or remove and repaint as required. Notify ENGINEER in writing of anticipated problems using specified painting systems with surfaces primed by others. Reprime equipment primed in factory and other factory-primed items that are damaged or scratched.

C. Related Sections:

4. Section 07 92 00, Joint Sealants.

D. Work Not Included: The following Work is not included as painting Work, or are included under other Sections or in other contracts:

1. Shop Priming: Shop priming of structural metal, miscellaneous metal fabrications, other metal items and fabricated components such as shop-fabricated or factory-painted process equipment, plumbing equipment, heating and ventilating equipment, electrical equipment, and accessories shall conform to applicable requirements of this Section but are included under other Sections or in other contracts.
2. Pre-finished Items:
 - a. Items furnished with such finishes as baked-on enamel, porcelain, and polyvinylidene fluoride shall only be touched up at Site by CONTRACTOR using manufacturer's recommended compatible field-applied touchup paint.
 - b. Items furnished with finishes such as chrome plating or anodizing.
3. Concealed Surfaces: Non-metallic wall or ceiling surfaces in areas not exposed to view, and generally inaccessible areas, such as furred spaces, pipe chases, duct shafts, and elevator shafts.

4. Concrete surfaces below elevation 286.00, unless otherwise shown or specified.
5. Concrete floors, unless specifically shown as a surface to be painted.
6. Face brick, glazed structural tile, and prefaced, split-faced concrete unit masonry.
7. Exterior face of architectural precast concrete.
8. Collector bearings, shafts and chains, wood flights, wood stop logs, and wood or fiberglass baffles.
9. Corrosion-Resistant Metal Surfaces: Where the natural oxide of item forms a barrier to corrosion, whether factory- or Site-formed, including such materials as copper, bronze, muntz metal, terne metal, and stainless steel.
10. Operating Parts and Labels:
 - a. Do not paint moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sensing devices, interior of motors, and fan shafts.
 - b. Do not paint over labels required by governing authorities having jurisdiction at Site, or equipment identification, performance rating, nameplates, and nomenclature plates.
 - c. Cover moving parts and labels during the painting with protective masking. Remove all protective masking upon completion of Work. Remove all paint, coatings, and splatter that comes in contact with such labels.
11. Structural and miscellaneous metals covered with concrete need not receive primers, intermediate, or finish coats of paint.
12. Existing structures, equipment, and other existing surfaces and items unless otherwise shown or specified. Existing south façade of existing garage building will be painted as it will become the interior wall of the new addition.

E. Description of Colors and Finishes:

1. Color Selection:
 - a. A maximum of three different colors will be selected by ENGINEER in addition to color coding of pipelines, valves, equipment, ducts, and electrical conduit.
 - b. ENGINEER reserves the right to select non-standard colors for paint systems specified within ability of paint manufacturer to produce such non-standard colors. Provide such colors at no additional expense to OWNER.
2. Color Coding of Pipelines, Valves, Equipment, and Ducts:
 - a. In general, color-coding of pipelines, valves, equipment, and ducts shall comply with applicable standards of ANSI A13.1, ANSI Z535.1 and 40 CFR 1910.144. Provide color-coding for pipelines per Table 09 91 00-B, Pipeline Color Table.
 - b. For equipment on roofs or exposed to view, such as on exterior building facades and in offices and lobbies, color shall be selected by ENGINEER.
3. Color Coding of Pipelines and Equipment:
 - a. Finish coats of paint for pipelines and equipment shall be coded in basic colors. Colors shall be brilliant, distinctive shades matching the following safety and pipeline colors per ANSI Z535.1, Recommended Standards for Water Works; Recommended Standards for Wastewater Facilities, color specifications for safety colors and other primary colors:

<u>Color</u>	<u>Designation*</u>
Aqua	Aqua Sky; 10GN
Black	Black; 35GR
Blue	True/Safety Blue; 11SF
Brown	Terra Cotta; 07RD
Charcoal	Deep Space; 34GR
Dark Blue	Academy Blue; 35BL
Dark Brown	Medium Bronze; 85BR
Dark Gray	Slate Gray; 31GR
Gray	Gray-ANSI 61; 33GR
Green	Spearmint/Safety Green; 09SF
Light Blue	Fontain Bleau; 25BL
Light Brown	Twine; 68BR
Light Gray	Light Gray; 32GR
Light Green	Margarita; 38 GN
Olive	Clover; 110GN
Orange	Tangerine/Safety Orange; 04SF
Red	Candy Apple/Safety Red; 06SF
White	White; 11WH
Yellow	Lemon/Safety Yellow; 02SF

* Color designations are provided per Tnemec Company, Inc. paint color numbers and are provided as a standard of quality; equivalent colors matching these colors are acceptable. Provide with Shop Drawing submittal direct color comparisons of color numbers available from manufacturer submitted.

b. General Color Code: Unless otherwise specified, use the following color code:

**TABLE 09 91 00-B
PIPELINE COLOR TABLE**

<u>Pipeline</u>	<u>Color</u>
<u>WATER</u>	
City Water	Blue
Cold Water	Blue
Fire Water	Red
Sprinkler Water	Red
<u>AIR AND GAS</u>	
Compressed Air	Dark Green
Furnace Stack Gas	Yellow
Natural Gas	Red/Black Bands

c. Color of final coats shall match as closely as possible, without custom blending, color tabulated for specific pipeline service.

4. After approval by ENGINEER of colors and Shop Drawings and prior to commencing painting Work, ENGINEER will furnish color schedules for surfaces to be painted.

F. Abbreviations and Symbols:

1. Abbreviations and symbols used in painting systems are explained in Article 2.2 of this Section and provide information on generic composition of required materials, manufacturers, number of coats and dry mil film thickness per coat (DMFTPC), and coverage for determining required number of gallons for the Work.

1.2 REFERENCES

A. Referenced Standards: Standards referenced in this Section are:

1. ANSI A13.1, Scheme for Identification of Piping Systems.
2. ANSI Z535.1, Safety Color Code.
3. ANSI/NSF Standard 60, Drinking Water Treatment Chemicals - Health Effects.
4. ANSI/NSF Standard 61, Drinking Water System Components – Health Effects.
5. ASTM D16, Terminology for Paint, Related Coatings, Materials and Applications.
6. ASTM D2200, Pictorial Surface Preparation Standards for Painting Steel Surfaces.
7. ASTM D4258, Practice for Surface Cleaning Concrete for Coating.
8. ASTM D4259, Practice for Abrading Concrete.
9. ASTM D4262, Testing Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
10. ASTM D4263, Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
11. ASTM D4285, Test Method for Indicating Oil or Water in Compressed Air.
12. ASTM D4417, Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel.
13. ASTM D4541, Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion-Testers.
14. ASTM E329, Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
15. AWWA C652, Disinfection of Water-Storage Facilities.
16. AWWA D102, Coating Steel Water-Storage Tanks.
17. California Air Resources Board (CARB) Revised Suggested Control Measure (SCM)
18. 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards.
19. 40 CFR, Subpart D-2001, National Volatile Organic Compound Emission Standards for Architectural Coatings.
20. South Coast Air Quality Management District (SCAQMD) Rule 1113,
21. Green Seal, Inc. Paint, (GS-11).
22. Maricopa County, Arizona Architectural Coatings Rule 335.

23. National Association of Piping Fabricators, NAPF 500-03, Surface Preparation Standard For Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings And/or Special Internal Linings.
24. Ozone Transport Commission, (OTC), OTC Model Rule for Architectural and Industrial Maintenance Coatings.
25. Resource Conservation and Recovery Act of 1976 (RCRA).
26. SSPC PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
27. SSPC SP 1, Solvent Cleaning.
28. SSPC SP 3, Power Tool Cleaning.
29. SSPC SP 6, Commercial Blast Cleaning.
30. SSPC SP 10, Near-White Blast Cleaning.
31. SSPC SP 11, Power Tool Cleaning To Bare Metal.
32. SSPC VIS 1, Visual Standard for Abrasive Blast Cleaned Steel.
33. SSPC VIS 2, Method of Evaluating Degree of Rusting/Painted Steel Surfaces.
34. SSPC Volume 2, Systems and Specifications.

1.3 DEFINITIONS

- A. Standard coating terms defined in ASTM D16 apply to this Section, including:
1. Paint: Pretreatment and all painting system materials, such as primer, emulsion, enamel, organic/inorganic polymer coating, stain sealer and filler, and other applied materials whether used as prime, filler, intermediate, or finish coats.
 2. Exposed: All items not covered with cement plaster, concrete, or fireproofing. Items covered with these materials shall be provided with specified primer only, except where specified as a surface not to be painted. Exposed-to-view surfaces include areas visible after permanent or built-in fixtures, convactor covers, ceiling tile, covers for finned tube radiation, grilles, and similar covering products are in areas scheduled to be painted.
 3. LEED Compliant: As defined by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), means interior field-applied coatings that shall have a maximum volatile organic compound (VOC) and chemical content as listed in Green Seal, Inc. Paints (GS-11).
 4. Low VOC: All interior and exterior field-applied coatings that have maximum VOC content as listed in OTC Model Rule for Architectural and Industrial Maintenance Coatings.
 5. OTC: Ozone Transport Commission, which recommends standard VOC content levels in several Northeastern and Mid-Atlantic states.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications:
1. Engage a single applicator that regularly performs installation of paint materials, with documented skill and successful experience in installing types of products required and that agrees to employ only trained, skilled tradesmen who have successful experience in installing types of products specified.

2. Submit name and qualifications to ENGINEER along with following information for at least three successful, completed projects:
 - a. Names and telephone numbers of owner and design professional responsible for project.
 - b. Approximate contract cost of paint products.
 - c. Amount of area painted.
 3. Submit to ENGINEER proof of acceptability of applicator by manufacturer.
- B. Testing Agency Qualifications: Provide an independent testing agency for testing specified in this Section. Testing agency shall be selected by OWNER and paid for by CONTRACTOR. When requested, submit documentation demonstrating to satisfaction of ENGINEER, that testing agency has experience and capability to satisfactorily conduct testing required without delaying the Work, in accordance with ASTM E329.
- C. Source Quality Control:
1. Obtain materials from manufacturers that will provide services of a qualified manufacturer's representative at Site at commencement of painting Work, to advise on products, mock-ups, installation, and finishing techniques and, at completion of Work, to advise ENGINEER on acceptability of completed Work and during the course of the Work as may be requested by ENGINEER.
 2. Certify long-term compatibility of all coatings with surfaces.
 3. Do not submit products that decrease number of coats, surface preparation, or generic type and formulation of coatings specified. Products exceeding VOC limits and chemical content specified will not be approved.
 4. ENGINEER may review manufacturers' recommendations concerning methods of installation and number of coats of paint for each painting system. CONTRACTOR shall prepare construction costs based on painting systems, number of coats, coverage's and installation methods specified.
 5. Submit "or equal" products, when proposed, with direct comparison to products specified, including information on durability, adhesion, color and gloss retention, percent solids, VOC's grams per liter, and recoatability after curing.
 6. "Or equal" manufacturers shall furnish same color selection as manufacturers specified, including intense chroma and custom pigmented colors in all painting systems.
 7. Color Pigments: Provide pure, non-fading, applicable types to suit surfaces and services to be painted. Comply with:
 - a. Lead and Chromate: Lead and chromate content shall not exceed amount permitted by authorities having jurisdiction.
 - b. Areas subject to hydrogen sulfide fume exposure will be identified by ENGINEER. Through CONTRACTOR, paint manufacturer shall notify ENGINEER of colors that are not suitable for long-term color retention in such areas.
 - c. Manufacturer shall identify colors that meet the requirements of authorities having jurisdiction at Site for use in locations subject to contact with potable water or water being prepared for use as potable water.

- d. Comply with paint manufacturer's recommendations on preventing coating contact with levels of carbon dioxide and carbon monoxide that may cause yellowing during application and initial stages of curing of paint.
- 8. Obtain each product from one manufacturer. Multiple manufacturing sources for the same system component are unacceptable.
- 9. Certify product shelf life history for each product source for materials manufactured by the same manufacturer, but purchased and stored at different locations or obtained from different sources.
- 10. Constantly store materials to be used for painting Work between 60 degrees F and 90 degrees F, and per paint manufacturer's written recommendations, for not more than six months. Certify to ENGINEER that painting materials have been manufactured within six months of installation and have not, nor will be, subjected to freezing temperatures.

D. Regulatory Requirements:

- 1. Comply with VOC content limits of OTC Model Rule for Architectural and Industrial Maintenance Coatings:
 - a. Industrial Maintenance Coatings: 340 grams per liter.
 - b. Interior and Exterior Non-Flat Coatings: 150 grams per liter.
- 2. Comply with the following:
 - a. 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards.
 - b. 40 CFR, Subpart D-2001, National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - c. Resource Conservation and Recovery Act of 1976 (RCRA).
 - d. SW-846, Toxic Characteristic Leaching Procedure (TCLP).
- 3. Comply with authorities having jurisdiction at Site for blast cleaning, confined space entry, and disposition of spent abrasive and debris.

E. Mock-ups:

- 1. Demonstrate installation of specified painting systems on actual wall surfaces and building components at locations selected by ENGINEER.
- 2. Provide 4-foot by 8-foot stepped-down sample area for each painting system. Prior to application of painting system, but after ENGINEER's approval of the components of each painting system, apply a 4-foot wide sample of each operation and application step required by this Section and specified manufacturer's written application recommendations. Show each application step as a 2-foot long section that shall remain exposed to demonstrate work performed in that step. Continue application procedures until topcoat is provided. Topcoat shall be a minimum of two feet long. When completed, finished mock-up for each paint system shall reveal each step and each coat of paint required for paint system with 2-foot wide strips revealing Work performed to prepare surface and apply each coat. Lengthen overall mock-up as required to completely demonstrate each painting system. Use tinted shades differing from coat to coat for each component of each painting system.
- 3. ENGINEER may approve or disapprove each component of each painting system on an individual component basis.

4. Painting Work that does not meet standard approved on sample areas shall be removed and replaced.
5. Painting Work advanced without approved mock-ups shall stop, and mock-ups prepared for approval by ENGINEER.

F. Pre-painting Conference:

1. Prior to installing painting systems, arrange a meeting at Site with painting applicator and its foreman, paint manufacturer's technical representative, installers of other work in and around painting that must follow painting Work, ENGINEER, and other representatives directly concerned with performance of painting Work. Record discussions of conference and decisions and agreements and disagreements and furnish a copy of record to each party attending. Review foreseeable methods and procedures relating to painting Work including:
 - a. Review Project requirements including Contract Documents, approved Shop Drawings, pending and approved Change Orders, requests for information that submitted by CONTRACTOR to ENGINEER, and other pertinent documents.
 - b. Review required samples and submittals, both completed and to be completed.
 - c. Review status of surfaces including drying, surface preparations, and similar considerations.
 - d. Review availability of materials, tradesmen, equipment, and facilities required for progress, to avoid delays, and to protect Work from damage.
 - e. Review required inspection, testing, certifying, and quality control procedures.
 - f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions. Supplemental heating sources required to for working in low-temperature conditions, shall be operating and acceptable to paint applicator and ENGINEER.
 - g. Review methods for complying with regulations of authorities having jurisdiction at Site, such as compliance with environmental protection, health, safety, fire, and similar regulations.
 - h. Review laws and procedures covering removal and disposal of blast debris.
2. Reconvene meeting at earliest opportunity if additional information must be developed to conclude the required topics of the meeting.
3. Record revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:
 - a. Copies of manufacturer's technical information and test performance data, including paint analysis, VOC, and chemical component content in comparison to maximum allowed by the Contract Documents, and application instructions for each product proposed for use.
 - b. Submit proof of acceptability of proposed application techniques by paint manufacturer selected.

- c. Copies of CONTRACTOR's proposed protection procedures in each area of the Work explaining methods of protecting adjacent surfaces from splatter, for confining application procedures in a manner that allows other work adjacent to surface preparation and painting Work to proceed safely and without interruption, and for maintaining acceptable application, curing, and environmental conditions during and after painting systems application.
 - d. List each material and cross-reference to the specific painting system and application, including a list of site-specific surfaces to which painting system will be applied. Identify by manufacturer's catalog number and general classification. State number of gallons of each product being purchased for delivery to Site and square foot area calculated to be covered by each painting system specified based on theoretical loss of 20 percent. Where actual area to be covered by paint system exceeds area submitted to ENGINEER for that system, proof of additional material purchase shall be provided to ENGINEER. Calculated coverage shall be as specified for each component of each painting system specified. This requirement does not take precedence over CONTRACTOR's responsibility to provide dry film thickness required for each component of each painting system.
 - e. Identify maximum exposure times allowable for each paint system component before next coat of paint can be applied. Submit proposed methods for preparing surfaces for subsequent coats if maximum exposure times are exceeded.
 - f. Information on curing times and environmental conditions that affect curing time of each paint system component and proposed methods for accommodating variations in curing time. Identify this information for each painting system in the Work.
 - g. Specification for spray equipment with cross-reference to paint manufacturer's recommended equipment requirements.
2. Samples:
- a. Copies of manufacturer's complete color charts for each coating system.
 - b. Mock-ups specified for the Site.

B. Informational Submittals: Submit the following:

- 1. Certificates:
 - a. Certificate from paint manufacturer stating that materials meet or exceed Contract Documents requirements.
 - b. Evidence of shelf life history for all products verifying compliance with the requirements of the Contract Documents.
 - c. CONTRACTOR shall provide notarized statement verifying that all painting systems are compatible with surfaces specified. All painting systems components shall be reviewed by an authorized technical representative of paint manufacturer for use as a compatible system. Verify that all painting systems are acceptable for exposures specified and that paint manufacturer is in agreement that selected systems are proper, compatible, and are not in conflict with paint manufacturer's recommended specifications. Show by

copy of transmittal form that a copy of letter has been transmitted to paint applicator.

2. Test Reports:
 - a. Certified laboratory test reports for required performance and analysis testing in compliance with ASTM E329.
 - b. Adhesion testing plan and procedures.
 - c. Results of adhesion testing on existing surfaces containing paints or other coatings to be topcoated with paint systems specified. Prior to adhesion testing, submit a testing plan establishing methods, procedures and number of tests in each area where existing coatings are to remain and become substrate for painting Work. Based on results of adhesion testing, recommend methods, procedures, and painting system modifications, if necessary, for proceeding with Work.
 - d. Locations of and test methods for soil sampling before beginning Work and after Substantial Completion.
 - e. Proposed methods for testing, handling, and disposal of waste generated during Work.
 - f. Results of alkalinity and moisture content tests performed in accordance with ASTM D4262 and ASTM D4263.
 - g. Results of tests of film thickness, holidays, and imperfections.
3. Manufacturer's Instructions: Provide paint manufacturer's storage, handling, and application instructions prior to commencing painting Work at Site.
4. Manufacturer's Site Reports: Provide report of paint manufacturer's representative for each visit to Site by paint manufacturer's representative.
5. Special Procedure Submittals:
 - a. Proposed protection procedures for each area of Work, explaining methods of protecting adjacent surfaces from splatter, for confining application procedures in a manner that allows other work adjacent to surface preparation and painting Work to proceed safely and without interruption.
 - b. Site-specific health and safety plan.
 - c. Procedures for maintaining acceptable application, curing and environmental conditions during and after painting systems application.
 - d. Procedures for providing adequate lighting, ventilation, and personal protection equipment relative to painting Work.
6. Qualifications:
 - a. Applicator.
 - b. Testing laboratory

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data: Upon completion of the painting Work, furnish ENGINEER five copies of detailed maintenance manual including the following information:
 - a. Complete and updated product catalog of paint manufacturer's currently available products including complete technical information on each product. Identify product names and numbers of each product used in the painting Work.

- b. Name, address, e-mail address and telephone number of manufacturer, local distributor, applicator and technical representative.
 - c. Detailed procedures for routine maintenance and cleaning.
 - d. Detailed procedures for light repairs such as dents, scratches and staining.
- 2. Record Documentation: Statement of Application: Upon completion of the painting Work, submit a notarized statement to ENGINEER signed by CONTRACTOR and painting applicator stating that Work complies with requirements of the Contract Documents and that application methods, equipment, and environmental conditions were proper and adequate for conditions of installation and use.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Product Delivery Requirements: Deliver products to Site in original, new, and unopened packages and containers, accurately and legibly and accurately labeled with the following:
 - 1. Container contents, including name and generic description of product.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Manufacturer's name.
 - 4. Contents by volume, for major pigment and vehicle constituents.
 - 5. Grams per liter of volatile organic compounds.
 - 6. Thinning instructions, where recommended.
 - 7. Application instructions.
 - 8. Color name and number.
- B. Product Storage Requirements:
 - 1. Store acceptable materials at Site.
 - 2. Store in an environmentally controlled location as recommended in paint manufacturer's written product information. Keep area clean and accessible. Prevent freezing of products.
 - 3. Store products that are not in actual use in tightly covered containers.
 - 4. Comply with health and fire regulations of authorities having jurisdiction at Site.
- C. Product Handling Requirements:
 - 1. Handle products in a manner that minimizes the potential for contamination, or incorrect product catalyzation.
 - 2. Do not open containers or mix components until necessary preparatory work has been completed and approved by ENGINEER and painting Work will start immediately.
 - 3. Maintain containers used in storing, mixing, and applying paint in a clean condition, free of foreign materials and residue.

1.7 SITE CONDITIONS

- A. Site Facilities:

1. Supplemental heat sources, as required to maintain both ambient and surface temperatures within range recommended by paint manufacturer for paint system application, are not available at Site.
2. Provision of supplemental heat energy sources, power, equipment, and operating, maintenance and temperature monitoring personnel is responsibility of CONTRACTOR.
3. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas being painted. Properly locate and vent such heat sources to exterior such that paint systems are unaffected by exhaust.

B. Existing Conditions:

1. Existing surfaces to receive painting Work shall be surface-prepared to meet requirements of painting systems specified. Prior to commencing painting Work, perform adhesion tests on existing surfaces to be painted. Perform testing per ASTM D4541 or other method acceptable to ENGINEER. Number and location of tests shall be sufficient to determine condition of existing coatings and suitability of existing coatings to remain to provide acceptable substrate for new coatings. Submit testing plan prior to testing and provide ENGINEER a copy of adhesion test results.
2. Provide abrasive blasting, scraping, or other abrading or surface film removal, or preparatory techniques accepted by ENGINEER.
3. Before commencing painting in an area, surfaces to be painted and floors shall be cleaned of dust using commercial vacuum cleaning equipment equipped with high-efficiency particulate air (HEPA) filters and dust containment systems.

C. Environmental Requirements:

1. Apply water-base paints when the temperature of surfaces to be painted and ambient air temperatures are between 55 degrees F and 90 degrees F, unless otherwise permitted by paint manufacturer's published instructions.
2. Surfaces to be painted shall be at least 5 degrees F above dew point temperature and be dry to the touch. Apply paint only when temperature of surfaces to be painted, paint products, and ambient air temperatures are between 65 degrees F and 95 degrees F, unless otherwise permitted by paint manufacturer's published instructions.
3. Apply paint system within shortest possible time consistent with manufacturer's recommended curing instructions for each coat. If chemical, salt, or other contamination contacts paint film between coats, remove contamination per SSPC SP 1 and restore surface before applying paint.
4. Do not paint tanks or pipelines containing fluid without specific permission of ENGINEER and only under conditions where "sweating" of outside surface of vessel being painted is not likely to occur within 24 hours of paint application.
5. Do not apply epoxy paints if ambient temperature is expected to go below 50 degrees F within twelve hours of application. Follow manufacturer's instructions when manufacturer's published recommendations require a higher minimum ambient temperature.

6. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent. Do not apply paint to damp or wet surfaces or when surfaces will reach dew point due to falling or rising temperatures and humidity conditions during course of paint application, unless otherwise permitted by paint manufacturer's published instructions.
7. Do not paint unacceptably hot or cold surfaces until such surfaces can be maintained within temperature and dew point ranges acceptable to paint manufacturer. Arrange for surfaces to be brought within acceptable temperature and dew point ranges as part of painting Work.
8. Moisture content of surfaces shall be verified to ENGINEER as acceptable prior to commencement of painting using methods recommended by paint manufacturer.
9. Painting may be continued during inclement weather only if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer for application and drying.
10. Provide adequate illumination and ventilation where painting operations are in progress.

D. Protection:

1. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently, or not to be painted.
2. During surface preparation and painting, facility shall remain in operation. Use procedures that prevent contamination of process or cause or require facility shutdown.
3. Coordinate and schedule surface preparation and painting to avoid exposing personnel to hazards associated with painting Work. Provide required personnel safety equipment per requirements of authorities having jurisdiction at Site.
4. Submit protection procedures to be employed. Do not begin surface preparation and painting Work until ENGINEER accepts protection techniques proposed by CONTRACTOR.
5. When working with flammable materials, provide fire extinguishers and post temporary signs warning against smoking and open flame.

1.8 MAINTENANCE

- A. Extra Materials: Furnish, tag, and store an additional one percent by volume of all coatings and colors installed. Provide a minimum of one gallon of each coating and color. Store in unopened containers as specified until turned over to OWNER.

PART 2 - PRODUCTS

2.1 PAINTING SYSTEM MANUFACTURERS

- A. Products and Manufacturers: Where referenced under painting systems provide products manufactured by the following:
1. Tnemec Company, Inc. (TCI).

2. The Carboline Company, part of StonCor Group, an RMP Company (TCC).
3. Sherwin-Williams Company (SWC).
4. Benjamin Moore & Company (BMC).
5. Righter Group Inc. (RGI).
6. Duron Inc. (DI).

2.2 PAINTING SYSTEMS

Surface/ Exposure	Surf. Prep.	Primer/Surfacer	(Coats) DFT (Mils)	Intermediate	(Coats) DFT (Mils)	Finish	(Coats) DFT (Mils)
		System Type	Max VOC g/l (EPA)	System Type	Max VOC g/l (EPA)	System Type	Max VOC g/l (EPA)
		% Solids		% Solids		% Solids	

Concrete Unit Masonry							
SYSTEM 09 91 00-A							
LEED Compliant; Semi-Gloss; Non- Submerged ; Interior	1.5.A.2. 3.2.A. 3.2.B.1. 3.2.B2. 3.2.B..8.	-Latex Block Filler M88 (BMC) Vinyl Acrylic 38%	(1) 7-14 61	<u>Primer</u> -Eco Spec Interior Latex Primer Sealer 231 (BMC) 100% Acrylic 34%	(1) .8 91	-Pristine Eco Spec Latex Enamel 224 (BMC) 100% Acrylic Latex 34%	(2) 1.4 50

Cast-In-Place Concrete Slab							
SYSTEM 09 91 00-B							
Sand Finish; Above Grade; Exterior	1.5.A.2. 3.2.A. 3.2.B.1. 3.2.B2. 3.2.B.3. 3.2.B.5. 3.2.B.6. 3.2.B.7. 3.2.B.8. 3.2.I.	<u>Cast-In-Place Concrete,</u> <u>Concrete Unit Masonry</u> <u>Primer</u> -Series 157 Enviro-Crete (TCI) -Flexxide Elastomer (TCC) Waterborne Acrylic 45%	(2) 6-8 85	<u>Wood Primer</u> -Series 151 Elasto-Grip (TTC) -Sanitile 120 (TCC) Waterborne Polyamine Epoxy 17%	(2) 0.7- 1.5 170	-Series 157 Enviro-Crete (TTC) -Flexxide Elastomer (TCC) Waterborne Acrylic Textured 45%	(2) 6-8 85

Ferrous Metals, Structural Steel, Exterior Surfaces of Valves and Piping							
SYSTEM 09 91 00-C							
Moderate VOC Content; Non-Submerged; Interior	1.5.A.2. 3.2.A. 3.2.C.1. 3.2.C.2.	-Series V69 Epoxoline II(TCI) -Carboguard 890 (TCC) Epoxy 67%	(1) 4-6 228	<u>Field Primer & Touch Up</u> -Series V69 Epoxoline II(TCI) -Carboguard 890 (TCC) Epoxy 69%	(1) 4-6 228	-Series V69 Epoxoline II (TCI) -Carboguard 890 (TCC) Epoxy 69%	(2) 3-6 H (2) 3-4 V 228

Ferrous Metals, Non-Ferrous Metals; Exterior Surfaces of Piping							
SYSTEM 09 91 00-D							
Submerged; Non-Submerged and Intermittently Submerged, Including up to 4 feet above Liquid Surface; Interior and Exterior	1.5.A.2. 3.2.A. 3.2.C.1. 3.2.C2. 3.2.E.	-Series 406 Elasto-Shield (TCI) -Polibrid 705 (TCC) Aromatic Polyurethane Hybrid 100%	(1) 6 0	<u>Field Primer & Touch Up</u> -Series 406 Elasto-Shield (TCI) -Polibrid 705 (TCC) Aromatic Polyurethane Hybrid 100%	(1) 25 0	-Series 406 Elasto-Shield (TCI) -Polibrid 705 (TCC) Aromatic Polyurethane Hybrid 100%	(1) 25 0

Gypsum Wallboard

TABLE 09900-E							
LEED Compliant; Interior.	1.5.B.1, 3.2.A. 3.2.H.	-Pristine Eco Spec Latex 231 (BMC) 100% Acrylic 30%	(1) 0.8 50	<u>Flat Finish</u> -Pristine Eco Spec Latex 219 (BMC) 100% Acrylic Latex 34%	(2) 1.2 50	<u>Semi-Gloss Finish</u> -Pristine Eco Spec Latex Enamel 224 (BMC) 100% Acrylic Latex 34%	(3) 1.4 50

Miscellaneous Materials

SYSTEM 09 91 00-F

Aluminum in Contact With Dissimilar Materials; Low VOC Content; Interior and Exterior.	1.5.A.2. 3.2.A. 3.2.D.	-Series 22 (TCI) -Carboguard 954 HB (TCC) Epoxy 100%	(1) 12-16 10			-Series 22 (TCI) -Carboguard 954 HB (TCC) Epoxy 100%	(1) 12-16 10
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SYSTEM 09900-CC

Pipe and Duct Insulation, Cloth, Paper and Canvas Jacketed Non-Submerged; Interior.	1.5.A.2. 3.2.A. 3.2.G.	-Series 115 Uni-Bond DF (TCI) -Sanitile 120 (TCC) Acrylic 38%	(1) 2-4 140			-Series 1029 Enduratone (TCI) -Carbocrylic 3358 (TCC) Acrylic 38%	(1) 2-3 94
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SYSTEM 09900-DD

PVC and CPVC Piping Fiberglass Insulation Covering; Non-Submerged; Interior.	1.5.A.2. 3.2.A. 3.2.F.	-Series 115 Uni-Bond DF (TCI) -Sanitile 120 (TCC) Acrylic 38%	(1) 2-3 140			- Series 1029 Enduratone (TCI) -Carbocrylic 3359 (TCC) Acrylic 36%	(1) 2-3 132
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2.3 CALKING AND SEALANTS

- A. Refer to Section 07 92 00, Joint Sealants.

2.4 INSTRUMENTS

- A. Instruments:
 - 1. Provide one new dry-film thickness gauge for checking film thickness, one holiday detector to detect holidays or holes in the coating, and one set of visual standards to check surface preparation. Calibrate dry film thickness gauge at Site using Bureau of Standards standard shim blocks.
 - 2. Products and Manufacturers: Provide the following:
 - a. Film Thickness Testers: Model FM-III manufactured by Mikrotest, or equal.
 - b. Holiday detector shall be Model M-1 as manufactured by Tinker & Rasor, or equal.
 - c. Visual Standards: ASTM D2200, Swedish Standards, SSPC VIS 1.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which painting Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film capable of performing in accordance with claims made in paint manufacturer's product literature for surfaces and conditions encountered.
- C. Do not paint over existing paint where there is no assurance that existing paint will provide an acceptable surface for long-term adherence and durability of painting systems specified or where paint manufacturer requires removal of all existing paint to recommend use of specified painting system.

3.2 SURFACE PREPARATION

- A. General:
 - 1. Test for moisture content of surfaces before commencement of painting Work. Test for moisture in concrete in compliance with ASTM D4263. Report results to ENGINEER before commencing Work.
 - 2. Prepare existing surfaces to be painted as specified for new surfaces. Submit substitute methods of preparing existing surfaces, when proposed, with Shop Drawing submittal. ENGINEER's acceptance of substitute

surface preparation methods does not relieve CONTRACTOR of performance required under the Contract Documents. To provide surfaces acceptable for application of painting system specified:

- a. Clean and roughen surfaces of existing paint and other decorative or protective toppings on surfaces to remain that are to receive a painting system under this Section.
 - b. Where existing surfaces to be painted have corrosion, peeling paint, or unacceptably adhering coatings, remove all topcoats, primers, and intermediate coats of paint, and other protective or decorative coatings.
 3. Perform preparation and cleaning procedures as specified herein and in strict accordance with paint manufacturer's approved instructions for each surface and atmospheric condition.
 4. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items already in place that do not require field painting, or provide effective surface-applied protection prior to surface preparation and painting.
 5. Remove as necessary items that must be field-painted where adjacent surfaces cannot be completely protected from splatter or overspray. Following completion of painting of each space or area, the removed items shall be reinstalled by workers skilled in the trades involved.
 6. Clean surfaces to be painted before applying painting system components. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning.
 7. Prepare surfaces that were improperly shop-painted and abraded or rusted shop-painted surfaces as specified.
- B. Cast-In-Place Concrete, Precast Concrete and Masonry Surfaces:
1. Prepare surfaces of concrete unit masonry to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and other contamination using soap and water. Surfaces shall be clean and dry at time of paint system application.
 2. Concrete unit masonry that cannot be adequately cleaned using soap and water shall be acid etched with a commercial solution of 15 percent muriatic acid.
 3. Prepare and clean cast-in-place concrete and precast concrete surfaces per ASTM D4259 to provide a uniform and continuous anchor profile of approximately one mil. Provide mechanical abrading and abrasive blasting per ASTM D4259. Use 40 to 80-mesh abrasive and clean, dry, compressed air. Compressed air cleanliness shall be per ASTM D4285. Pressure at blasting nozzle shall not exceed 80 pounds per square inch. Do not concentrate blast on surface; instead, move at a fairly rapid rate to provide a surface free of laitants and contaminants. Provide post-surface preparation cleaning per ASTM D4258 to remove loose material. Surface preparation shall open all surface air holes by removing laitance shoulders surrounding air holes. Vacuum surfaces to remove dust and sand, and wash with potable water.
 4. Where paint system is for chemical containment barrier protection, repair cracks and expansion joints in concrete and provide 2-inch radiused cove

base fillets at equipment pads and containment walls as part of complete chemical containment paint system Work. Use materials and techniques recommended by manufacturers of the paint and concrete repair products.

5. Remove from cast-in-place concrete fins, projections, and other surface irregularities that would protrude above level of finished intermediate fillers and surfacers. Remove by chipping and scarification by mechanical abrasion.
6. Using specified filler and surfacer, patch cast-in-place concrete and precast concrete surfaces as required to completely fill surface air holes and honeycombing. Level all protrusions, grind filler and surfacing compounds smooth, and level with adjacent surfaces.
7. Perform tests per ASTM D4262 and ASTM D4263 to verify alkalinity and moisture content of surfaces to be painted, and report findings to ENGINEER. If, in ENGINEER's opinion, surfaces are sufficiently alkaline to cause blistering and burning of paint, correct the condition before applying paint. Provide suitable testing materials for alkalinity and moisture tests. Do not paint surfaces where the moisture content exceeds eight percent.
8. Where a concrete unit masonry block filler is specified, spot patch holes and cracks with a putty knife using specified block filler. Apply to large surfaces by airless spray and backroll uniformly using a roller with a synthetic nap cover. Follow with a rubber squeegee to provide a smooth finish.

C. Ferrous Metals:

1. Ferrous Metals Except Ductile and Cast Iron:
 - a. Comply with paint manufacturer's recommendations for type and size of abrasive to provide a surface profile that meets manufacturer's painting system requirements for type, function, and location of surface. Verify that paint manufacturer-recommended profiles have been achieved on prepared surfaces. Report profiles to ENGINEER using Test Method C of ASTM D4417.
 - b. Clean non-submerged ferrous surfaces including structural steel and miscellaneous metal to be shop-primed, of all oil, grease, dirt, mill scale, and other contamination by commercial blast cleaning complying with SSPC SP 6 at time of paint system application, using SSPC VIS 1 as a standard of comparison.
 - c. Clean submerged ferrous surfaces including structural steel and miscellaneous metal to be shop-primed of all oil, grease, dirt, mill scale, and other contamination by near-white blasting complying with SSPC SP 10 at time of painting system application, using SSPC VIS 1 as a standard of comparison.
 - d. Clean non-submerged, ferrous surfaces that have not been shop-coated of all oil, grease, dirt, loose mill scale, and other contamination by commercial blasting complying with SSPC SP 6 at the time of painting system application, using SSPC VIS 1 as a standard of comparison.
 - e. Clean submerged ferrous surfaces that have not been shop-coated or that have been improperly shop-coated of all oil, grease, dirt, mill

scale, and other contamination by near-white blasting complying with SSPC SP 10 at time of painting system application, using SSPC VIS 1 as a standard of comparison.

- f. Touch-up shop-applied prime coats that have damaged or have bare areas with primer recommended by paint manufacturer after commercial blasting complying with SSPC SP 6 at the time of painting system application, using SSPC VIS 1 as a standard of comparison, to provide a surface profile of not less than one mil.
 - g. Power tool-clean per SSPC SP 3 to remove welding splatter and slag.
 - h. Remove all rust and contamination on existing ferrous metals to sound surfaces by power tool-cleaning complying with SSPC SP 11 to provide a surface profile of not less than one mil.
- D. Non-Ferrous Metal Surfaces: Prepare non-ferrous metal surfaces for painting by light whip blasting or by lightly sanding with 60- to 80-mesh sandpaper.
- E. Galvanized (Zinc-Coated) Surfaces: Prepare galvanized surfaces for painting by lightly sanding with 60- to 80-mesh sandpaper or by light whip blasting.
- F. PVC and CPVC Piping and Fiberglass: Lightly sand and clean surfaces to be painted. Fiberglass surfaces shall be prepared by solvent washing to remove wax and other contaminants, before abrading surfaces with 60- to 80-mesh sandpaper to provide an anchor pattern with scratches no further apart than 1/16-inch.
- G. Covering on Pipe Insulation:
- 1. Remove all oil and surface contaminants as recommended by paint and insulation cover manufacturer for surface and application required.
 - 2. Do not cut or damage insulation and covering.

3.3 PROTECTION OF PROPERTY AND STRUCTURES

- A. Protect property and structures adjacent to the Work from waste residues resulting from cleaning, surface preparation and paint application.
- B. Use shrouding, vacuum blasting, or other approved methods for cleaning and surface preparation of exterior surfaces.
- C. During blast cleaning and surface preparation of interior and exterior surfaces, control discharge of dust and grit, using shrouding, negative-pressure containment/dust collection systems, or other means to protect adjacent property and structures and prevent dust/grit from escaping. Similarly control removal and temporary storage of residues to protect adjacent property and structures.
- D. For painting of exterior surfaces, use rollers, shrouding or other approved methods as required to protect adjacent property and structures from wind-blown paint residues.

- E. Submit proposed procedures for cleaning, surface preparation and paint application describing methods for protecting adjacent property and structures from residues. Do not proceed with cleaning, surface preparation or painting until proposed procedures are approved by ENGINEER.

3.4 MATERIALS PREPARATION

- A. General:
 - 1. Mix and prepare paint products in strict accordance with paint manufacturer's product literature.
 - 2. Do not mix painting materials produced by different manufacturers, unless otherwise permitted by paint manufacturer's instructions.
 - 3. Where thinners are required, they shall be produced by paint system manufacturer unless otherwise permitted by paint manufacturer's product literature and submitted to and accepted by ENGINEER with Shop Drawings.
- B. Tinting:
 - 1. Where multiple coats of the same material are to be provided, tint each undercoat a lighter shade to facilitate identification of each coat of paint.
 - 2. Tint undercoats to match color of finish coat of paint, but provide sufficient difference in shade of undercoats to distinguish each separate coat. Provide a code number to identify material tinted by manufacturer.
- C. Mixing:
 - 1. For products requiring constant agitation, use methods in compliance with manufacturer's product literature to prevent settling during paint application.
 - 2. Mix in containers placed in suitably sized non-ferrous or oxide resistant metal pans to protect floors from slashes or spills that could stain the floor or react with subsequent finish floor material.
 - 3. Mix and apply paint in containers bearing accurate product name of material being mixed or applied.
 - 4. Stir products before application to produce a mixture of uniform density and as required during the application. Do not stir into the product film that forms on surface; instead, remove film and, if necessary, strain product before using.
 - 5. Strain products requiring such mixing procedures. After adjusting mixer speed to break up lumps and after components are thoroughly blended, strain through 35 to 50-mesh screen before application.

3.5 APPLICATION

- A. General:
 - 1. Apply paint systems by brush, roller, or airless spray per manufacturer's recommendations and in compliance with Paint Application Specifications No. 1 in SSPC Volume 2, where applicable. Use brushes best suited for type of paint applied. Use rollers of carpet, velvet back, or high pile sheeps

wool as recommended by paint manufacturer for product and texture required. Use air spray and airless spray equipment recommended by paint manufacturer for specific painting systems specified. Submit a list of application methods proposed, listing paint systems and location.

2. Paint dry film thicknesses required are the same regardless of the application method. Do not apply succeeding coats until previous coat has completely dried.
3. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is uniform finish, color, and appearance, particularly for intense chroma primary colors. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a film thickness equivalent to that of flat surfaces.
4. Surfaces of items not normally exposed-to-view do not require the same color as other components of system of which they are part, but require the same painting system specified for exposed surfaces of system.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint before final installation of registers or grilles.
6. Paint backs of access panels and removable or hinged covers to match exposed surfaces.
7. Paint aluminum parts in contact with dissimilar materials with specified paint system.
8. Paint tops, bottoms, and side edges of doors the same as exterior surfaces.
9. Omit field-applied primer on metal surfaces that have been primed in the shop. Touch-up paint shop-primed coats and pre-finished items only when approved by ENGINEER using compatible primers and manufacturer's recommended compatible field-applied finishes.
10. Welds shall be stripe-coated with intermediate or finish coat of paint after application of prime coat.

B. Minimum/Maximum Paint Film Thickness:

1. Apply each product at not less than, nor more than, manufacturer's recommended spreading rate, and provide total dry film thickness as specified.
2. Apply additional coats of paint if required to obtain specified total dry film thickness.
3. Maximum dry film thickness shall not exceed 100 percent of minimum dry film thickness, except where more stringent limitations are recommended by paint manufacturer for a specific product.

C. Scheduling Surface Preparation and Painting:

1. As soon as practical after preparation, apply first-coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting. Apply first-coat material before subsequent surface deterioration due to atmospheric conditions existing at time of surface preparation and painting. Surfaces that have started to rust before first-coat application is complete shall be brought back to required standard by abrasive blasting.

2. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure and application of another coat of paint does not cause lifting or loss of adhesion to undercoat.
 3. Scarify primers and other painting system components by brush-blasting if paint has been exposed for lengths of time or under conditions beyond manufacturer's written recommendations for painting systems required, intended use, or method of application proposed for subsequent coats of paint.
 4. Schedule cleaning and painting so that dust and other contaminants from cleaning process do not fall on wet, newly painted surfaces.
- D. Prime Coats: Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.
- E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.
- F. Brush Application:
1. Brush out and work all brush coats onto surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections are unacceptable. Neatly draw all glass and color break lines.
 2. Brush-apply primer or first coats, unless otherwise permitted to use mechanical applicators.
- G. Mechanical Applicators:
1. Use mechanical methods for paint application when permitted by governing ordinances, manufacturer, and approved by ENGINEER.
 2. Limit roller applications, if approved by ENGINEER, to interior wall finishes for second and third coats. Apply each roller coat to provide the equivalent hiding as brush-applied coats.
 3. Where spray application is used, apply each coat to provide equivalent hiding of brush-applied coats. Do not double back with spray equipment for purpose of building up film thickness of multiple coats in one pass.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint Work not in compliance with specified requirements as required by ENGINEER.

3.6 FIELD QUALITY CONTROL

- A. ENGINEER may invoke the following material testing procedure at any time for a maximum of five times during field painting Work:
1. CONTRACTOR shall engage service of an independent testing laboratory to sample paints used, as designated by ENGINEER. Samples of products delivered to Site shall be obtained, identified, sealed, and certified as to

being products actually applied to surfaces in each area, in presence of CONTRACTOR.

2. A testing laboratory selected by OWNER and paid for by CONTRACTOR shall perform appropriate tests for any or all the following:
 - a. Abrasion resistance.
 - b. Apparent reflectivity.
 - c. Flexibility.
 - d. Washability.
 - e. Absorption.
 - f. Accelerated weathering.
 - g. Dry opacity.
 - h. Accelerated yellowness.
 - i. Recoating.
 - j. Skinning.
 - k. Color retention.
 - l. Alkali resistance.
 - m. Quantitative materials analysis.
 3. If test results show that products being used do not comply with specified requirements, CONTRACTOR may be directed to stop painting Work and remove non-complying paint, and shall prepare and repaint surfaces coated with rejected paint with material complying with the Contract Documents.
- B. Notify ENGINEER after completing each coat of paint. After inspection and checking of film thickness, holidays, and imperfections, and after acceptance by ENGINEER, proceed with succeeding coat. Perform testing using testing instruments specified in Article 2.4 of this Section.
1. ENGINEER will witness all testing and shall be notified of scheduled testing at least twenty-four hours in advance.
 2. Apply additional coats, if required, to produce specified film thickness and to correct holidays and to completely fill all surface air holes.
- C. For magnetic substrates, measure thickness of dry film nonmagnetic coatings following recommendations of SSPC PA-2. These procedures supplement manufacturers' approved instructions for manual operation of measurement gauges and do not replace such instructions.
- D. Record time, location, number of coats, dry film thickness, holidays, and other imperfections and submit testing results to ENGINEER.

3.7 PROTECTION OF NEW FINISHES

- A. Provide signs that read, "Wet Paint" as required to protect newly painted finishes. Remove temporary wrappings provided for protection of the Work and work of other contractors after completion of painting.

3.8 ADJUSTING AND CLEANING

- A. Correct damages to work of other trades through cleaning, repairing or replacing, and repainting, as acceptable to ENGINEER.
- B. During progress of Work, remove from Site all discarded paint materials, rubbish, cans, and rags at end of each workday.
- C. Upon completion of painting, clean paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, while avoiding scratching or otherwise damaging finished surfaces.
- D. At completion of work of other trades, touch-up and restore damaged or defaced painted surfaces as determined by ENGINEER.

3.9 SCHEDULES

- A. The schedules listed below, following the “End of Section” designation, are a part of this Specification section.
 - 1. Table 09 91 00-C, Painting Schedule.

**TABLE 09 91 00-C
PAINTING SCHEDULE**

Facility or Surface *	Room No.	Painting System **	Remarks
Interior surfaces of new concrete unit masonry knee walls, surfaces of new concrete unit masonry walls @ Sprinkler Closet.	100 & 102	A	
Concrete slab paint striping (room 100), edges of any new equipment pads		B	
Exterior surfaces of valves and piping, new, interior	100	C	
All New Hollow Metal Doors		D	
Structural steel, new, interior and exterior	101	D	
All New, Interior, Gypsum Wallboard	102	E	
Any New Aluminum in Contact with Dissimilar Materials		F	

* Refer to Drawings for facility locations and for facilities not listed above.

** Refer to Article 2.2 of this Section.

+ + END OF SECTION + +

SECTION 10 14 00

SIGNAGE

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install signage.
 - a. CONTRACTOR shall be responsible for all signage furnished under this Section for the entire Project in accordance with the Contract Documents.
2. Extent of signage is shown and specified.
3. Types of products required include the following:
 - a. Room identification, information, entry, and directional signs.
 - b. Health, safety, warning, floor loading and fire extinguisher location signs.
 - c. Pipe markers, tags, and equipment nameplates.
 - d. Right-to-know labels, signs, and tags.
 - e. Exterior building identification signs.
 - f. Stainless steel fasteners, supports, very-high-bond high-performance mounting tape, primers, and other accessories.

B. Coordination:

1. Coordinate adhesives and fasteners with mounting surfaces. Review other Sections to ensure compatibility of signage mounting accessories with various surfaces on which signage will be installed.
2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before signage Work.
3. Notify other contractors in advance of installing signage to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before signage Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. AA DSA-45, Designation System for Aluminum Finishes.
2. ASME A13.1 Scheme for the Identification of Piping Systems.
3. ANSI/ICC A117.1, Accessible and Usable Buildings and Facilities.
4. ANSI Z535.1, Marking Physical Hazards Safety Color Code.
5. ANSI Z535.2, Environmental and Facility Safety Signs.
6. ANSI Z535.3, Criteria for Safety Symbols.
7. ASTM B26/B26M, Specification for Aluminum-Alloy Sand Castings.

8. ASTM B584, Specification for Copper Alloy Sand Castings for General Applications.
9. ASTM E527, Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS).
10. CDA, Properties of Cast Copper Alloys.
11. NFPA 704, System for the Identification of the Hazards of Materials for Emergency Response.
12. UL 924, Safety of Emergency Lighting and Power Equipment.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Signage Manufacturers:
 - a. Engage firms specializing in producing types of products specified, in compliance with the Contract Documents, with documented record of successful in-service performance, and that possess sufficient production capacity to avoid delaying the Work.
 - b. Submit to ENGINEER name and experience record of manufacturers.

B. Component Supply and Compatibility:

1. Obtain each separate type of signage from a single Supplier and from a single manufacturer.

C. Regulatory Requirements: Comply with applicable requirements of the following:

1. OSHA, 29 CFR Part 1910.1200, Hazard Communication Standard.
2. OSHA, 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances.
3. OSHA, 29 CFR Part 1910.144, Safety Color Code for Marking Physical Hazards.
4. OSHA, 29 CFR Part 1910. 145, Specification for Accident Prevention Signs and Tags.
5. United States Access Board, Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines.
6. Americans with Disabilities Act (ADA), Public Law 101-36, 28 CFR Part 36, Appendix A, Accessibility Guidelines for Buildings and Facilities (ADAAG), relative to characters and symbols contrast only.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Schedule of all signage required for the Work, indicating signage type location, and other information to demonstrate compliance with the Contract Documents.
 - b. Fabrication and erection information for each type of signage
 - c. Valve schedule for small-diameter valves, in accordance with this Section.

- d. Complete, camera-ready, color graphic layouts of custom- designed signs based on specified requirements and manufacturer recommendations.
- e. Complete selection of each specified manufacturer's standard and custom graphic layouts and pictograms, colors, and alphabetic/text styles.
- f. Full-size graphic layout drawings for plaques, individual dimensional letters and numbers, and other items where final graphic appearance is necessary prior to signage fabrication, incorporating all required graphic features specified or shown.
- g. Mounting and Installation Data:
 - 1) Drawings of and information on anchorages and accessory items.
 - 2) Submit location template drawings for items supported or anchored to permanent construction.
 - 3) Coordinate mounting position, method, and proposed mounting accessories and fasteners with actual Project conditions. Indicate required mounting accessories on plan drawings showing locations of required exit signs based on measurements taken at the Site. Show final location and identify type of mounting surface for each exit sign. Coordinate location of exit signs for non-interference with other Work and as required by authorities having jurisdiction.
- 2. Product Data:
 - a. Copies of manufacturer's technical data, including catalog information and specifications, for each product specified.
- 3. Samples:
 - a. Each color and finish of exposed materials and accessories required for signage.
 - b. Sample Signage:
 - 1) Full-size Sample of each type of permanent room and space identification sign, and informational and directional sign incorporating all features specified.
 - 2) Full-sized Sample of each type (such has snap-on, strap-on, and adhesive) of pipe marker proposed for use with mounting accessories.
 - 3) Full-sized Sample equipment nameplate, valve tag, pipe tag, and accessories. Stamp valve tag with information shown on valve schedules. When not indicated in the Contract Documents, information on the type of coding system will be furnished to CONTRACTOR by ENGINEER.
 - 4) Full-sized Sample right-to-know signs, labels and tags.
 - 5) Full-size representative sample of each individual-type letter and number specified, demonstrating alphabetic style/text type, material, color, and finish specified.
 - c. ENGINEER's review of Samples will be for color and texture only. Compliance with other requirements is CONTRACTOR's responsibility.

- B. Informational Submittals: Submit the following:
 - 1. Manufacturer's Instructions:
 - a. Templates for anchorages to be installed in concrete or masonry.
 - b. Manufacturer's instructions and recommendations for support and foundations of signs installed outdoors.
- C. Closeout Submittals: Submit the following:
 - 1. Warranty Documentation:
 - a. General and special warranties required under this Section.
- D. Maintenance Material Submittals: Submit the following:
 - 1. Extra Stock Materials:
 - a. Furnish extra stock materials from the same manufactured lot as the materials installed.
 - b. Submit documentation of actual quantities of signage installed for the Project and calculations indicating the required quantity of extra stock materials.
 - c. Furnish the following spare parts and accessories:
 - 1) For every 20 of each type (snap-on, strap-on, adhesive type) of pipe markers installed:
 - a) One complete mounting assembly.
 - 2) For every 20 equipment nameplates installed:
 - a) One complete nameplate mounting assembly.
 - 3) For every 20 valve tags and pipe tags installed:
 - a) One stainless steel cable and splice.

1.5 WARRANTY

- A. General Warranty: The special warranty specified for each type of sign in this Article shall not deprive OWNER of other rights or remedies OWNER may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by CONTRACTOR under the Contract Documents. The obligations of CONTRACTOR under the Contract Documents shall not be limited in any way by the provisions of the specified special warranty.
- B. Special Warranty on Products:
 - 1. Provide each signage manufacturer's written warranty, running to the benefit of OWNER, agreeing to correct, or at option of OWNER, remove or replace materials specified in this Section found to be defective during a period of five years after the date of Substantial Completion.
 - 2. Special warranty shall cover defective Work that includes, but is not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

A. General:

1. Details shown or indicated for signage, such as alpha-numeric and text type representation, letter spacing, designs of borders, and other graphic features, are generic and intended only to establish text, general positions, and symbols.
2. Colors shall be brilliant, distinctive shades, matching the safety colors specified in ANSI Z535.1 and OSHA 1910.144.
3. Permanent rooms and spaces, and directional and informational signage where specified as accessible to people with disabilities, shall comply with ANSI/ICC A117.1 and ADA-ABA Accessibility Guidelines.
4. Accident prevention signs and tags shall comply with OSHA 1910.145.
5. Health, safety, and warning signs shall comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, OSHA 1910.144, and 1910.145, unless otherwise shown or indicated. Colors shall be as indicated in Table 1 of ANSI Z535.1. In addition to text, safety symbol pictograms shall be incorporated into each sign.

2.2 PANEL SIGNS – ROOM IDENTIFICATION, INFORMATION, ENTRY, AND DIRECTIONAL

A. Products and Manufacturers: Provide one of the following:

1. Graphic Blast MP and FG ADA System and Custom Design ADA Series, by Best Sign Systems, Inc.
2. Blast Etched Fiberglass and Blast Etched Melamine Signs, by Visigraph Corporation.
3. Or equal.

B. Panel Signs – Room Identification, Information, Entry, and Directional:

1. Product Description: Provide unframed signs, surface-etched, 1/32-inch raised tactile lettering and pictograms, sandblasted on an opaque sheet.
2. Materials:
 - a. Interior Signs: Three-ply, self-extinguishing melamine plastic.
 - b. Exterior Signs: One-piece fiberglass.
3. Size and Thickness: 0.125-inch thick; eight inches by eight inches with 1/2-inch radiused corners.
4. Graphics and Text: White, Standard Helvetica Medium characters and matching arrow type-face; upper and lower case letters, one-inch high capitals and, in addition, Grade 2 Braille alphabet for room designation, directional, entry, and information signs.
5. Colors and Contrast: Background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast by at least 70 percent with their background as determined by ADA formula in ADAAG Appendix A4.30.5.

2.3 PANEL SIGNS – HEALTH, SAFETY, WARNING, FLOOR LOADING, AND FIRE EXTINGUISHER LOCATION

- A. Product Description: Provide rigid fiberglass reinforced plastic signs with fade-resistant embedded graphics.
- B. Products and Manufacturers: Provide one of the following:
 - 1. Graphic Blast Word and Picture Series, by Best Sign Systems, Inc.
 - 2. Blast Etched Fiberglass Signs, by Visigraph Corporation.
 - 3. Or equal.
- C. General:
 - 1. Size and Thickness: 0.125-inch thick; 10 inches by 14 inches, unless otherwise shown or indicated.
 - 2. Graphics and Text: Standard Helvetica Medium characters and matching arrow type-face; upper and lower case, one-inch high capitals and, in addition, Grade 2 Braille alphabet message designations and other text.
 - 3. Exposure: As recommended by sign manufacturer for both indoor and outdoor use and with an upper service temperature limit of 190degrees F. Average durability for outdoor use shall be 15 years.
- D. Safety Instruction Signs: Standard color of sign background shall be white; panel shall be green with white letters and numbers. Letters and numbers used against white background shall be black.
- E. Caution Signs: Standard color of sign background shall be yellow; panel shall be black with yellow letters and numbers.
- F. Danger Signs: Standard color of sign background shall be white; panel shall be black with red insert with white letters and numbers. Letters and numbers used against white background shall be black.
- G. Warning Signs: Standard color of sign background shall be orange; panel shall be black with orange insert with black letters and numbers. Letters and numbers used against orange background shall be black.
- H. No Smoking Signs: Standard color of sign background shall be white. Letters and numbers used against white background shall be red.
- I. Biohazard Signs: Standard color of sign background shall be white; panel shall be black with white letters. Sign shall include red international biohazard pictogram on white background.
- J. Floor Loading Signs: Standard color of sign background shall be white; panel shall be blue with white letters and numbers. Letters and numbers used against white background shall be black.

- K. Fire Extinguisher Location Signs (surface-mounted units only): Standard color of sign background shall be red with white letters and numbers. Each sign shall include international fire extinguisher pictogram and directional arrow indicating location of fire extinguisher.
- L. Auxiliary Products:
1. Mounting Brackets: Provide sign manufacturer's standard mounting brackets for installing projected or double-sided signs.

2.4 PIPE MARKERS

- A. Description:
1. Provide pipe markers for each pipeline provided under the Contract, and for other piping indicated to receive pipe markers.
- B. Products and Manufacturers: Provide one of the following:
1. Custom High Performance Pipe Markers (B-689), and SnapOn and StrapOn Pipe Markers (B-915), by Brady Worldwide, Inc., Signmark Division.
 2. Custom Ultra-Mark High Performance Pipe Markers, by Seton Identification Products, a Tricor Direct Company.
 3. Or equal.
- C. Pipe Markers:
1. Lettering of Titles/Legend and Color Field Size:
 - a. Letter size and color field length shall be as indicated in Table 10 14 00-A of this Section:

**TABLE 10 14 00-A, PIPE MARKERS:
SIZE OF TEXT AND COLOR FIELD**

Outside Diameter of Pipeline or Covering* (inches)	Size of Text (Legend Characters)	Minimum Length of Color Field**
3/4 to 1.25	1/2-inch	8 inches
1.5 to 1-7/8	3/4-inch	8 inches
2 to 5-7/8	1.25-inch	12 inches
6 to 9-7/8	2.5-inch	24 inches
10 and Larger	3.5-inch	32 inches
*Outside diameter includes pipe diameter plus insulation and jacketing. **Length of sign and color field shall be as required to accommodate required legend, and shall not be less than minimum length indicated unless required otherwise by space constraints.		

- b. Text and symbols shall be Standard Helvetica Medium, all upper case. Pipe markers shall include text with separate arrow signs indicating direction of flow of pipeline contents. Pipe markers with arrows shall be located as specified in Part 3 of this Section.

- c. Pipe markers indicating pipeline contents shall identify pipeline contents by complete name, as indicated in Table 10 14 00-B of this Section. Obtain from ENGINEER interpretation of required pipe marker text for pipelines provided under the Project that are not listed in Table 10 14 00-B of this Section.
- 2. Pipe Marker Materials:
 - a. General: The following are applicable to all types of pipe markers furnished under this Section:
 - 1) Provide pipe markers with ultraviolet light-resistant, sealed, subsurface color graphics, recommended by sign manufacturer, suitable for both indoor and outdoor use.
 - 2) Pipe markers shall be resistant to abrasion, chemical reagents, and physical agitation such as washdowns and wind.
 - 3) Provide manufacturer's full selection of standard and custom sizes and graphics.
 - 4) Where manufacturer has established minimum order quantities for custom units provide minimum order quantities at no additional cost to OWNER.
 - b. Materials: Provide the following at CONTRACTOR's option, suitable for outside diameter of the associated pipe and pipe covering:
 - 1) Adhesive, Wrap-Around Pipe Markers: Adhesive pipe markers shall be coiled construction, 0.006-inch total thickness, PVF over laminated polyester, with peel-off backing. Suitable for service temperature ranging from -40 degrees F to 230 degrees F.
 - 2) Snap-on Pipe Markers: Snap-on pipe markers shall be cylindrically coiled, printed plastic sheets. Pipe marker total thickness for pipe and pipe covering from 3/4-inch to 2-3/8-inch outside diameter shall be not less than 0.020-inch. Pipe marker total thickness for pipe and pipe covering from 2.5-inch through six-inch outside diameter shall be not less than 0.030-inch. Suitable for service temperature ranging from -40 degrees F to 180 degrees F.
 - 3) Strap-on Pipe Markers: Provide strap-on pipe markers where pipe diameter is large enough to preclude overlap of pipe marker material around the circumference of the pipe. Strap-on pipe markers shall be flat, printed plastic sheets, not less than 0.020-inch total thickness, constructed to be attached to the pipe with bands. Suitable for service temperature ranging from -40 degrees F to 180 degrees F. Provide each pipe marker with two 1/4-inch wide band straps of nylon, plastic, or stainless steel, lengths as required by circumference of pipe and pipe covering. Provide manufacturer's recommended banding tools for banding.
- 3. Legend for Pipe Markers: Pipe markers shall have the text or abbreviations in the color combinations indicated in Table 10 14 00-B of this Section to identify the pipeline service hazard. Pipe marker colors shall comply with ASME A13.1, unless otherwise indicated.

TABLE 10 14 00-B, SCHEDULE OF PIPE MARKERS*		
Pipeline Legend	Lettering/Text Color	Background Color
<u>WATER</u>		
City Water	White	Green
Cold Water	White	Green
Fire Water	White	Red
Sprinkler Water	White	Red
<u>AIR AND GAS</u>		
Compressed Air	White	Blue
City Gas	White	Brown
Furnace Stack Gas	Black	Orange
Natural Gas	White	Brown

- * Where shown or specified, the legend for blowoff, drain, metering, sump, vent, and similar pipelines shall also include the equipment number or structure name, as applicable, served by the pipeline. Provide the number in the same color as the pipeline.

2.5 EQUIPMENT NAMEPLATES

A. Description:

1. Provide equipment nameplate for each equipment item furnished under the Contract, and for other equipment items indicated to receive nameplates. Equipment nameplates specified in this Article are in addition to equipment manufacturer's standard nameplate with manufacturer name, model number, serial number, and similar information.
2. Install equipment nameplates as indicated in Part 3 of this Section. Mechanically fasten equipment nameplates to the associated equipment item.

B. Products and Manufacturers: Provide one of the following:

1. Stainless Steel (HEET) Tags (B-748) custom engraved, by Brady Worldwide, Inc.
2. Custom Engraved Stainless Steel Nameplates, by Seton Identification Products, a Tricor Direct Company
3. Or equal.

C. Equipment Nameplates:

1. Material: Type 304 or Type 316 stainless steel, 26-gage, with rounded corners. Suitable for temperatures ranging from -40 to 89 degrees C.
2. Provide each equipment nameplate with not less than two holes, each approximately 3/16-inch diameter, for mechanically fastening nameplate to the associated equipment. Provide appropriate stainless steel fasteners.
3. Nameplate Size:
 - a. Size shall be as required for required text, and shall be not less than one-inch by four inches.
4. Text Engraved on Nameplates:
 - a. Text Size: Equipment nameplate titles shall have text as large as possible to fit on nameplate; text shall be not less than 1/2-inch high. All text on a given nameplate shall be one size.
 - b. Text and symbols shall be Standard Helvetica Medium, all upper-case.
 - c. Left-justify multiple lines of text
 - d. Where more than one item of the same type of equipment is furnished, consecutively number each associated equipment nameplates as shown or indicated; for example "Pump No. 1", "Pump No. 2", "Pump No. 3", and so on.
5. Legend for Nameplates:
 - a. Nameplates for equipment, including operating stands for valves and gates, shall be in accordance with the required text and colors indicated in Table 10 14 00-C.
 - b. Obtain interpretation from ENGINEER for equipment not included in Table 10 14 00-C.

TABLE 10 14 00-C, SCHEDULE OF EQUIPMENT NAMEPLATES*			
Legend		Color	
First Line	Second Line	Lettering/Text	Background
Air Compressor	**		
Air Handling Unit	**		
Exhaust Fan	**		
High Pressure Air Compressor	**		

* Where equipment is installed on roofs or where exposed to the public view such as in lobby or office areas, color will be selected by ENGINEER.

** The legend on the indicated nameplates shall also include the appropriate number designation for such equipment, including valve stands and gate operators as shown on the Process and Instrumentation Drawings or as indicated by ENGINEER.

2.6 PANEL SIGNS – EXTERIOR BUILDING IDENTIFICATION

- A. Products and Manufacturers: Provide one of the following:
 - 1. Graphic Blast Wall Mounted Signs, by Best Manufacturing Sign Systems, Inc.
 - 2. Blast Etched Fiberglass Exterior Signs by Visigraph Corporation.
 - 3. Or equal.
- B. Material: Provide surface-etched lettering and pictograms, sandblasted on an opaque three-ply laminate of 1/4-inch thick flat three-ply glass-reinforced resin sheet with non-glare surface and contrasting color core suitable for continuous operating temperatures of 190 degrees F.
- C. Alphabet and Graphics: Provide four-inch high helvetica alphabet; upper and lower case letters and matching arrow type face.
- D. Provide opaque white letters on opaque background color to match existing signs with concealed, flush-mounted fasteners at each corner. Provide two signs each 15 inches by 15 inches with 1/8-inch radiused corners.

2.7 AUXILIARY MATERIALS

- A. Very-High-Bond High-Performance Bonding Tape:
 - 1. Provide all surface-mounted signage with very-high-bond foam tape backing except where specified as requiring mechanical fasteners.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Scotch Brand (Very-High-Bond) 4942 VHB Double Coated Acrylic Foam Tape and No. 94 Acrylic Primer, by 3M Industrial Tape and Specialties Division.
 - b. Or equal.
 - 3. Provide a very-high-bonding pressure sensitive joining system consisting of double-coated conformable acrylic foam tape and release liners.
 - 4. Thickness: 0.045-inch.
 - 5. Tape Width: 1.5 inches.
 - 6. Color: Dark gray.
 - 7. Bonding Adhesive: Acrylic; very-high-bond, solvent and shear resistance.
 - 8. Primer: High-performance tape manufacturers recommended acrylic primer.
- B. Fasteners: Provide fasteners of non-magnetic stainless steel of size and type required and recommended by the associated individual signage manufacturer.
- C. Anchors and Inserts: Provide nonferrous metal or hot-dipped galvanized anchors and inserts. Provide toothed stainless steel or lead expansion bolts for drilled-in-place anchors.

D. Mounting Brackets:

1. Provide manufacturer's standard mounting brackets for each of the following sign types: hanging, projected, double-sided.
2. Provide inserts, and mechanical and adhesive anchoring devices as specified in this Article for installation of signage.

2.8 FABRICATION

A. Shop Assembly:

1. Fabricate and preassemble items in the shop to the greatest extent possible.
2. Disassemble units only to extent necessary for shipping and handling limitations.
3. Clearly mark units for reassembly and coordinated installation.

2.9 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:

1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within tolerance of plus or minus 1/16-inch measured diagonally across each sign.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrates and conditions under which signage will be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

1. Location:
 - a. Install signage and appurtenances at the locations shown or indicated. When locations are not shown or indicated, install signage at locations directed by ENGINEER.
 - b. Provide exit signs at locations shown or indicated. Surface-mount signs above each point of egress, unless otherwise shown or indicated.
 - c. Lightly mark and locate position of each sign. Obtain ENGINEER's acceptance of marked locations before mounting.
2. Installation – General:
 - a. Install signs level, plumb, and at proper height.
 - b. Signage shall be securely mounted with concealed, very-high-bond acrylic foam tape, specified adhesives, or mechanical fasteners where

- specified. Attach signs to surfaces in accordance with sign manufacturer's instructions, unless otherwise shown or indicated.
- c. Provide very-high-bond acrylic foam tape on back of signage using a full perimeter of specified tape. Leave no gaps in tape perimeter at back of signage; peel off second release liner and press onto surfaces.
3. Repair or replace damaged units.
- B. Panel Signs – Room Identification, Directional, and Information Signs:
1. Where permanent identification is provided for rooms and spaces, install signs on the wall adjacent to the latch side of the door.
 2. Where there is no wall space on the latch side of the door, including at double leaf doors, install signs on the nearest adjacent wall.
 3. Mounting height shall be in accordance with ADA-ABA Accessibility Guidelines in areas accessible to disabled people. For other areas install signs with five feet from the finished floor to centerline of sign. Mount such signage so that a person may approach within three inches of the sign without encountering protruding objects or, when reading sign, be forced to stand within the swing of a door.
- C. Pipe Markers, Equipment Nameplates, and Pipe and Valve Tags:
1. Location of Pipe Markers and Pipe Tags:
 - a. Provide pipe markers with text (pipeline contents or service) and adjacent arrow indicating the direction of flow of pipeline contents on each piping system provided under the Project and other piping systems shown or indicated as to receive pipe markers.
 - b. Locations: Provide pipe markers at each of the following locations:
 - 1) At intervals of not more than 30 linear feet apart
 - 2) Directly adjacent to each side of each penetration by the pipeline of the following: wall, floor, ceiling, roof.
 - 3) Adjacent to each change in flow direction.
 - 4) On each branch where pipes connect together including but not limited to tees, wyes, and crosses.
 - 5) Adjacent to each side of each valve (including but not limited to check valves, isolation valves, control valves, and other valves), strainer cleanouts, and each equipment item along the pipeline.
 - 6) Comply with ASME A13.1.
 - c. Provide flow-direction arrows at intervals not greater than 15 linear feet. Where flow may be bi-directional, provide arrows adjacent to each other to indicate both directions.
 - d. Pipe marker locations will be determined by ENGINEER, but in general place pipe markers where personnel view of label is unobstructed. When pipeline is overhead, install label on the two lower quarters of the pipe or pipe covering. Pipe markers shall be clearly visible from personnel operating positions, especially operating positions adjacent to valves and equipment.
 - e. Provide pipe tags, where specified, at locations as specified for pipe markers.

2. Location of Valve Tags and Valve Nameplates:
 - a. Valve nameplates and valve signs for large valves shall be located on or adjacent to the valve.
 - b. For smaller valves, attach tags to valve bonnet or valve flange bolts.
 - c. For valves to receive equipment nameplates, as specified in this Section, install nameplate as required for other equipment nameplates.
 - d. Do not attach tags, nameplates, or signs to valve handwheels or other valve actuators.
 3. Equipment Nameplates:
 - a. Locate nameplates on equipment bases and on structures at readily-visible elevation in such positions relative to the equipment and structures as to prevent damage to nameplate.
 - b. Position nameplate for ease of reading by operations and maintenance personnel.
- D. Panel Signs – Right-To-Know Signs, Labels, and Tags:
1. Locate tags at intervals of not more than 20 feet center-to-center along chemical pipelines and fill pipelines and on each side of locations where pipelines emerge from penetrations with other materials.
 2. Install tank signs on each tank shown or indicated to receive signage at quarter-points on tank circumference, five feet above finished floor.

3.3 PROTECTION AND CLEANING

- A. After installation, clean soiled signage surfaces in accordance with manufacturer's written instructions.
- B. Protect signage from damage until completion of the Work.

+ + END OF SECTION + +

SECTION 10 22 13

WIRE MESH PARTITIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install wire mesh partitions.
 - 2. Extent of wire mesh partitions are shown.
 - 3. Types of products required include the following:
 - a. Heavy-duty industrial woven wire mesh.
 - b. Formed channel uprights, caps, center channels and cast floor sockets.
 - c. Sliding door with heavy-duty hardware.
 - d. Auxiliary system components, fasteners and trim.
- B. Coordination:
 - 1. Review installation procedures under other sections and coordinate the installation of items that must be installed with or before the wire mesh partitions.
- C. Related Sections:
 - 1. Section 03 30 00, Concrete.
 - 2. Section 04 00 05, Masonry.
 - 3. Section 08 71 00, Door Hardware.
 - 4. Section 09 91 00, Painting.

1.2 REFERENCES

- A. American Society for Testing and Materials, (ASTM).
 - 1. ASTM A 36, Specification for Carbon Structural Steel.
 - 2. ASTM A 123/A 123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A 500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 4. ASTM A 568/A 568M, Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
 - 5. ASTM A 641/A 641M, Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

6. ASTM A 653/A 653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. ASTM A 853, Specification for Steel Wire, Carbon, for General Use.
8. ASTM E 437, Specification for Industrial Wire Cloth and Screens (Square Opening Series).

1.3 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.
- B. Samples: Submit the following:
 1. 12-inches square pieces of wire mesh and 6-inches long sections of frame members, with manufacturer's standard paint finish.
 2. Complete selection of manufacturer's standard and custom colors for final selection by Engineer.
 3. Engineer's review of samples will be for color and finish only. Compliance with all other requirements is the responsibility of Contractor.
- C. Shop Drawings: Submit the following:
 1. Fabrication and erection drawings. Include plans, elevations, and large scale details for entire wire mesh partition system. Show doors, openings, anchorage, and auxiliary items. Provide location template drawings for items supported or anchored to permanent construction.
 2. Manufacturer's specifications and installation instructions for all system components.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Engage a single installer regularly performing installation of wire mesh partitions with documented skill and successful experience in the installation of the types of materials required; and who agrees to employ only tradesmen who are trained, skilled and have successful experience in installing the types of materials specified.
 2. Submit name and qualifications to Engineer along with the following information on a minimum of three successful projects:
 - a. Names and telephone numbers of owners, architects or engineers responsible for projects.
 - b. Approximate contract cost of the wire mesh partitions.
 - c. Amount of area installed.
- B. Component Supply and Compatibility:
 1. Provide each type of wire mesh partition specified as a complete system,

including necessary mounting accessories, hardware, fittings and fastenings, produced by a single manufacturer and recommended by the manufacturer for extra-heavy or severe industrial service.

2. In some cases, minor incidental accessories necessary to the proper functioning of the specified item may not be mentioned in these Specifications. Contractor shall follow the recommendations of the manufacturer of the item specified and provide Work with all required incidental accessories necessary to the proper functioning of the system, based on the required level of service specified, at no additional cost to Owner. Provide materials matching the material of similar items specified.

C. Erection Tolerances:

1. Limit variations from plumb, level or dimensioned angle to the following:
 - a. 1/8-inch maximum deviation in height or in ten-foot vertical or angular run, and in 20 foot horizontal runs.
 - b. 1/4-inch maximum deviation in 40 foot runs, all directions.
2. Limit offsets in end-to-end and edge-to-edge alignments of adjoining and consecutive members, which form planes, continuous runs and profiles, to the following:
 - a. 1/16-inch maximum offset in flush alignment, including members that are to be 1/2-inch or less out-of-flush, and including members which are separated 2-inches or less by a reveal or protrusion in the plane of the wire mesh partition system.
 - b. 1/8-inch maximum offset in alignments which are to be out-of-flush by more than 1/2-inch or separated by a reveal or protrusion of more than 2-inch width.

1.5 DELIVERY, STORAGE AND HANDLING

A. Section 01 65 00 – Product Delivery, Storage and Handling Requirements: Requirements for transporting, handling, storing and protection products.

B. Delivery of Materials:

1. Deliver material to the Site in manufacturer's original, unopened and undamaged packages, legibly labeled and accurately representing contents, indicating material submitted on approved Shop Drawings.
2. Clearly identify manufacturer, brand name, contents, color stock number, and order number on each package.
3. Inspect materials, account for the presence of all hardware, auxiliary items, bolts, fasteners and other accessories required for the Work, and reject components differing from approved Samples and Shop Drawings. Immediately remove rejected components from the Site.
4. Do not open packages or remove markings until packages are inspected

and accepted. Packages showing indications of damage that may affect condition of contents will not be acceptable. Packages with illegible or removed labels will be rejected for use in the Work.

- C. Storage of Materials:
 - 1. Store in original packaging under protective and secure cover, protected from all damage and construction traffic.
 - 2. Stack containers in accordance with manufacturer's approved written recommendations.
- D. Handling of Materials:
 - 1. Handle materials in such manner as to prevent damage to products or finishes.

1.6 PROJECT CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements in areas of installation before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 2. Where field dimensions cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field dimensions. Coordinate supports and adjacent wall, column, floor and ceiling construction locations to ensure actual dimensions correspond to dimensions established for wire mesh partition Work.
- B. Conform to applicable OSHA and the New York State Building Codes.

1.7 WARRANTY

- A. Section 01 78 36 – Warranties: Requirements for warranties

PART 2 PRODUCTS

2.1 PERFORMANCE CRITERIA

- A. Performance Criteria:
 - 1. Dimensions of all system components specified are minimums. Do not use components less than the size specified.
 - 2. Where manufacturer's span tables indicate acceptability of lesser thickness materials than specified for extra-heavy or severe industrial service, provide specified thicknesses and features as a minimum. Where span tables indicate the need for greater thickness, or additional features, than

specified, provide greater thicknesses and features, at no additional cost to Owner.

3. In some cases minor incidental accessories necessary to the proper functioning of the specified item may not be mentioned in these Specifications. Contractor shall follow the recommendations of the manufacturer of the item specified and provide Work with all required incidental accessories necessary to the proper functioning of the item, at no additional cost to Owner. Provide materials matching the material of similar items specified.

2.2 MANUFACTURERS

- A. Products and Manufacturers: Provide one of the following:
 1. No. 135-Heavy Duty Wire Mesh Partition System by Acorn Wire and Iron Works, Incorporated.
 2. No. 300M-Heavy Duty Wire Mesh Partition System by Miller Wire Works, Incorporated.
 3. Severe-Duty Wire Mesh Partition System by The GS Company.
 4. Or Approved Equal.

2.3 MATERIALS

- A. Steel Wire: In compliance with ASTM A 853.
- B. Steel Channels, Angles, Plates, and Bars: In compliance with ASTM A 36.
- C. Steel Sheet: In compliance with ASTM A 568.
- D. Square Steel Tubing: In compliance with ASTM A 500.
- E. Galvanized Steel Wire: In compliance with ASTM A 641.
- F. Galvanized Steel Sheet: Commercial-quality, hot-dipped-coated steel sheet, ASTM A 653, G60 coating.

2.4 FABRICATIONS

- A. Mesh: Washburn & Moen No. 6-gage (0.192-inches) crimped steel wire, minimum; woven into 2-inch diamond mesh, in compliance with ASTM E 437; clinched and secured to frame members.
- B. Posts:
 1. Corner Posts: 2-inches by 2-inches by 1/8-inch steel angles with floor shoe and with 3/8-inch diameter bolt holes to align with bolt holes in vertical

frame members.

- a. For other than 90 degree intersections use manufacturer's recommended tubular corner posts and installation accessories.
 2. Line Posts: Where partition runs exceed 20 feet without intersecting framing or connection to overhead framing, provide 3-inch by 4.1 pound steel channel line posts with 5-inch by 18-inch by 1/4-inch steel base plates located at manufacturer's recommended intervals to ensure partition rigidity and stability.
 3. Intersection Posts: Where three- or four-way intersections occur, use 2-inch by 2-inch tubular steel post with floor shoe and 3/8-inch diameter bolt holes aligned for bolting to adjacent panels.
- C. Frames: Provide cutouts for pipes, ducts, beams, and other items shown or necessary for partition installation. Finish edges of cutouts with channels matching adjacent frame members.
1. Frame Members: 1-1/2-inches by 3/4-inch by 1/8-inch cold-rolled steel channels with 3/8-inch diameter bolt holes approximately 18 inches on centers.
 2. Horizontal Reinforcing Members: 1-1/2-inches by 3/4-inch by 1/8-inch cold-rolled steel channels with wire woven through or two 1-inch by 1/2-inch steel channels bolted or riveted toe to toe through mesh, mortised, tenoned and welded to vertical members. Provide number of horizontal reinforcing members as required for panel height as recommended by wire mesh partition manufacturer and as shown on approved Shop Drawings.
- D. Doors:
1. Sliding Door: 6 feet-0 inches wide by 7 feet-6 inches high, minimum. Door frame of 1-1/2-inches by 3/4-inch by 1/8-inch channel with 1-1/2-inches by 1/8-inch flat bar cover plate on all four sides.
 - a. Provide door with two, 4-wheel roller-bearing carriers, box track, bottom guide channel and bronze mortise-type cylinder lock operated by key outside and recessed knob inside. Align bottom of door with bottom of adjacent panels.
 - b. Provide cylinders for lock, keyed and master keyed to building system.
 - c. Cylinders for locks are specified in the Section 08 71 00.
- E. Auxiliary Components:
1. Stiffening Bars: Provide flat steel bar stiffener posts between abutting panel frames. Size as recommended by wire mesh partition manufacturer, as shown on approved Shop Drawings, for required partition height. Increase size of stiffening bars as required for partition rigidity.
 2. Top Capping Bars: 3-inches by 4.1 pound cold-rolled steel channels, secured to top framing channel with 1/4-inch diameter U-bolts spaced not

- more than 28 inches on centers.
3. Sheet Metal Base: Panels formed of 16-gage (0.0625-inch) steel sheet, bolted to frames.
 4. Floor Shoes: Cast aluminum, sized to suit vertical framing and to provide approximately 3-inches clear space between finish floor and bottom horizontal frame members. Provide units with set screw for leveling adjustment.
 5. Bolts, Fasteners and Trim: As recommended by the manufacturer to provide a complete and fully assembled system meeting all performance criteria specified.
 6. Furnish inserts and anchoring devices that shall be set in concrete or built into masonry for the installation of the wire mesh partition Work. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other Work to avoid delay.

2.5 FINISH

- A. Electrostatic Sprayed Enamel: Phosphate-coated and electrostatic sprayed enamel, oven dried or baked. Color as selected by Engineer from manufacturer's full range of standard and custom colors.
 1. Primer: Manufacturer's recommended primer.
 2. Provide manufacturer's recommended matching touch-up paint for on-Site application after erection of wire mesh partition system.
- B. Galvanized: Hot-dipped in compliance with ASTM A 123, ASTM A 641 and ASTM A 653, as appropriate to the wire mesh system component.
- C. Painting: Provide paint system conforming to the requirements of Section 09 91 00.

PART 3 EXECUTION

3.1 INSPECTION

- A. Contractor and his installer shall examine the areas where wire mesh partitions units are to be installed, and the conditions under which the Work will be performed. Notify Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 INSTALLATION

- A. Section 01 70 00 – Execution and Closeout: Requirements for installations.

- B. Install all bolts, hardware, fasteners and accessories for a complete installation.
- C. Erect partitions plumb, rigid, properly aligned and securely fastened in place in compliance with erection tolerances specified.
- D. Provide additional field bracing, as shown or recommended by the manufacturer, for rigid, secure installation.
- E. Installation of inserts and anchorage devices shall be in accordance with Section 03 00 05, and Section 05 05 33 and the manufacturer's written and approved recommendations.

3.3 ADJUSTMENT AND CLEANING

- A. Adjust moving components for smooth operation without binding.
- B. Touch-up damaged finishes, after completion of installation, using field-applied paint to match color of shop-applied finish.

- END OF SECTION -

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install all fire protection specialties Work.
 - 2. Extent of fire protection specialties Work is shown and specified.
 - 3. Types of fire protection specialties Work required includes:
 - a. Dry chemical extinguishers.
 - b. Mounting accessories and miscellaneous fasteners.
- B. Coordination:
 - 1. Review installation procedures under other Sections and coordinate installation of items that must be installed with or before fire protection specialties.
- C. Related Sections:
 - 1. Section 10 14 00, Signage.

1.2 REFERENCES

- A. Standards referenced in this Section are:
 - 1. ASTM E814, Test Method for Fire Tests of Penetration Firestop Systems.
 - 2. FM Global, FM Approval Guide.
 - 3. NFPA 10, Portable Fire Extinguishers.
 - 4. UL Fire Classification Rating.
 - 5. U.S. Architectural & Transportation Barriers Compliance Board's Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities.

1.3 QUALITY ASSURANCE

- A. Component Supply and Compatibility:
 - 1. Provide fire protection specialties products from one manufacturer.
- B. Certifications: Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.
 - 2. Provide fire extinguishers approved, listed, and labeled to comply with ASTM E814.

- C. Regulatory Requirements:
1. Provide fire protection specialties approved and labeled by UL.
 2. Provide fire protection specialties conforming to NFPA 10 requirements.
 3. Provide fire protection specialties conforming to ADA-ABA Accessibility Guidelines.

1.4 SUBMITTALS

- A. Action Submittals:
1. Product Data: Submit the following:
 - a. Manufacturer's technical data, certification of UL rating, and installation instructions for fire protection specialties.
 - b. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
 - c. Product Schedule: For fire extinguishers and fire protection cabinets. Coordinate final fire extinguisher and fire protection cabinet schedule to ensure proper fit and function.
- B. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.
 2. Warranty: Sample of special warranty.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 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.
 - b. Faulty operation of valves or release levers.
 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. General: Provide manufacturer's standard mounting brackets for portable fire extinguishers size as specified.

- B. Multi-Purpose Dry Chemical Fire Extinguishers:
 - 1. Ten-pound capacity, enameled steel container with pressure-indicating gauge, for Class A, Class B, Class C fires, UL rating 4A-60 B:C.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Cosmic Model 10E by J.L. Industries, a division of Activar Construction Products Group.
 - b. MP 10 Series by Larsen's Manufacturing Company.
 - c. Or equal.
- C. Identification: Refer to Section 10 14 00, Signage.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrates and conditions under which fire protection specialties will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to ENGINEER.

3.2 INSTALLATION OF FIRE EXTINGUISHERS

- A. When exact locations of fire protection specialties are not shown on Drawings, locate as directed by ENGINEER.
- B. Securely fasten products to structure, square and plumb, per Supplier's instructions. Mounting heights shall be:
 - 1. Install fire extinguishers to meet ADA/ABA requirements.
 - 2. Install fire extinguishers with gross weight greater than 40 pounds with top of fire extinguisher no more than 3.5 feet above finished floor.
 - 3. Install fire extinguishers with gross weight less than 40 pounds with top of fire extinguisher no more than 4.0 feet above finished floor.
 - 4. Clearance between bottom of fire extinguisher and finished floor shall be at least four inches.
- C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semi-recessed 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.
- D. Identification Devices: Refer to Section 10 14 00, Signage.
- E. Recharge fire extinguishers provided under this Contract so that most recent inspection date coincides as nearly as possible with date of Substantial Completion.

Inform OWNER in writing of next required inspection and recharging date.

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.

3.4 FIRE EXTINGUISHER SCHEDULE

- A. Type A – Dry chemical, wall mounted.

+ + END OF SECTION + +

SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Supplier-Erector shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to design, furnish, and install all metal building systems. The Work also includes:
 - a. Building into metal building systems required items and providing openings, closures, and escutcheons for metal building systems to accommodate the Work under this and other Sections and attaching to the metal building systems all items such as sleeves, hoods, supports, fasteners, and all items required, for which provision is not specifically included under other Sections.
 - b. Building into the metal building systems required items and providing openings, closures, and escutcheons for metal building systems to accommodate the Work under other contracts and attaching to the metal building systems all items required, for which provision is not specifically included under other contracts.
2. Extent of metal building systems is shown.
3. Types of products required include the following:
 - a. Multi-bay clear span structural system of low rigid frame type.
 - b. Multi-bay clear span structural system of lean-to frame type.
 - c. Insulated metal roof panel system.
 - d. Insulated metal wall panel system.
 - e. Insulation.
 - f. Personnel doors, with glass, and trim.
 - g. Double personnel doors to be installed by General Contractor.
 - h. Louvers.
 - i. All auxiliary system components and miscellaneous accessories, fasteners, trim, framed openings, flashing closures, base moldings, gutters, downspouts, vapor retarders and all other items not specified under this or other Sections, but required to provide a completely watertight and functioning building.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with, or before, the metal building systems.

2. Notify other Contractors in advance of the installation of the metal building systems to provide them with sufficient time for the installation of items that must be installed with, or before, the metal building systems.
3. Coordinate the locations of equipment, piping, heating and ventilating ductwork, electrical conduit, and similar items in order to provide required clearances and supports for such items without modification of metal building system components at the Site.

C. Related Sections:

1. Section 07 92 00, Joint Sealants.
2. Section 08 36 16, Sectional Doors.
3. Section 08 71 00, Door Hardware.
4. Section 08 90 00, Louvers and Vents.
5. Section 09 91 00, Painting.

1.2 REFERENCE STANDARDS

A. Comply with the applicable provisions and recommendations of the following, except as otherwise shown and specified:

1. ASTM A36, Carbon Structural Steel, Standard Specification for.
2. ASTM A53, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless, Standard Specification for.
3. ASTM A153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware, Standard Specification for.
4. ASTM A307, Carbon Steel Bolts and Studs, 60,000psi Tensile Strength, Standard Specification for.
5. ASTM A325, High-Strength Bolts for Structural Steel Joints, Standard Specification for.
6. ASTM A366, Commercial Steel (CS) Sheet, Carbon, (0.15 Maximum Percent) Cold-Rolled, Standard Specification for.
7. ASTM A463, Steel Sheet, Aluminum-Coated, by the Hot-Dip Process, Standard Specification for.
8. ASTM A475, Zinc-Coated Steel Wire Strand, Standard Specification for.
9. ASTM A490, Heat-Treated Steel Structural Bolts, 150ksi Minimum Tensile Strength, Standard Specification for.
10. ASTM A500, Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes, Standard Specification for.
11. ASTM A501, Hot-Formed Welded and Seamless Carbon Steel Structural Tubing, Standard Specification for.
12. ASTM A529, High-Strength Carbon-Manganese Steel of Structural Quality, Standard Specification for.
13. ASTM A568, Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for, Standard Specification for.
14. ASTM A569, Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality, Standard Specification for.

15. ASTM A570, Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality, Standard Specification for.
16. ASTM A572, High-Strength Low-Alloy Columbium-Vanadium Structural Steel, Standard Specification for.
17. ASTM A611, Structural Steel (SS), Sheet, Carbon, Cold-Rolled, Standard Specification for.
18. ASTM A653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, Standard Specification for.
19. ASTM A687, High-Strength Nonheaded Steel Bolts and Studs, Standard Specification for.
20. ASTM A755, Sheet Steel, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products, Standard Specification for.
21. ASTM A792, Sheet Steel, 55 Aluminum-Zinc Alloy-Coated by the Hot-Dip Process, Standard Specification for.
22. ASTM B695, Coatings of Zinc Mechanically Deposited on Iron and Steel, Standard Specification for.
23. ASTM C36, Gypsum Wallboard, Standard Specification for.
24. ASTM C423, Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method, Standard Test Method for.
25. ASTM C442, Gypsum Backing Board and Coreboard, Standard Specification for.
26. ASTM C578, Rigid, Cellular Polystyrene Thermal Insulation, Standard Specification for.
27. ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing, Standard Specification for.
28. ASTM C920, Elastomeric Joint Sealants, Standard Specification for.
29. ASTM C991, Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings, Standard Specification for.
30. ASTM C1107, Packaged Dry, Hydraulic-Cement Grout (nonshrink), Standard Specification for.
31. ASTM C1136, Flexible, Low Permeance Vapor Retarders for Thermal Insulation, Standard Specification for.
32. ASTM D523, Specular Gloss, Standard Test Method for.
33. ASTM D1494, Diffuse Light Transmission Factor of Reinforced Plastics Panels, Standard Specification for.
34. ASTM D3841, Glass-Fiber-Reinforced Polyester Plastic Panels, Standard Specification for.
35. ASTM D4214, Evaluating Degree of Chalking of Exterior Paint Films, Standard Test Method for.
36. ASTM E84, Surface Burning Characteristics of Building Materials, Standard Test Method for.
37. ASTM E94, Radiographic Testing, Standard Guide for.
38. ASTM E96, Water Vapor Transmission of Materials, Standard Test Methods for.

39. ASTM E119, Fire Tests of Building Construction and Materials, Standard Test Methods for.
40. ASTM E136, Behavior of Materials in a Vertical Tube Furnace at 750⁰ C, Standard Test Method for.
41. ASTM E142, Controlling Quality of Radiographic Testing, Standard Method for.
42. ASTM E164, Ultrasonic Contact Examination of Weldments, Standard Practice for.
43. ASTM E165, Liquid Penetrant Examination, Standard Test Method for.
44. ASTM E283, Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen, Standard Test Method for.
45. ASTM E329, Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction, Standard Specification for.
46. ASTM E331, Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference, Standard Test Method for.
47. ASTM E548, General Criteria Used for Evaluating Laboratory Competence, Standard Guide for.
48. ASTM E709, Magnetic Particle Examination, Standard Guide for.
49. ASTM E1646, Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference, Standard Test Method for.
50. ASTM E1680, Rate of Air Leakage Through Exterior Metal Roof Panel Systems, Standard Test Method for.
51. ASTM F959, Compressible-Washer Type Direct Tension Indicators for Use with Structural Fasteners, Standard Specification for.
52. Metal Building Manufacturers Association (MBMA), Low Rise Building Systems Manual.
53. American Institute of Steel Construction (AISC), S303 - Code of Standard Practice for Steel Buildings and Bridges.
54. American Institute of Steel Construction (AISC), S335 - Specification for Structural Steel Buildings, Allowable Stress Design, Plastic Design.
55. American Iron and Steel Institute (AISI), SG-671 - Specification for the Design of Cold-Formed Steel Structural Members.
56. American Iron and Steel Institute (AISI), SG-911 - Load and Resistance Facet Design Specification for Steel Structural Members.
57. American Society of Civil Engineers, ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
58. Architectural Metal Products Division of The National Association of Architectural Metal Manufacturers (NAAMM), Metal Finishes Manual for Architectural and Metal Products.
59. American Welding Society (AWS), D1.1 - Structural Welding Code - Steel.
60. American Welding Society (AWS), D1.3 - Structural Welding Code - Sheet Steel.
61. Sheet Metal and Air Conditioning Contractors National Association, Incorporated, SMACNA, Architectural Sheet Metal Manual.

62. Steel Door Institute, SDI 122, Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
63. National Fire Protection Association, NFPA 80, Standard for Fire Doors and Fire Windows.
64. National Fire Protection Association NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
65. Research Council on Structural Connections, (RCSC), Specification for Structural Joints Using ASTM A325 and ASTM A490 Bolts.
66. Steel Joist Institute (SJI), Standard Specifications and Load Tables.
67. Steel Structures Painting Council (SSPC), Steel Structures Painting Manual Vol. 2.
68. Underwriters' Laboratories Incorporated (U.L.), Standard for Safety - UL 580 - Tests for Uplift Resistance of Roof Assemblies.

1.3 DEFINITIONS

- A. Terminology used in this Specification shall comply with MBMA's, "Low Rise Building Systems Manual" and "Metal Building Systems Manual" for definitions of terms for metal building systems construction, and the following:
1. The term "bay spacing" shall mean the dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured perpendicular to end wall (outside face of end-wall girt).
 2. The term "building length" shall mean the dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).
 3. The term "building width" shall mean the dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).
 4. The term "clear span" shall mean the distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame, or knee).
 5. The term "eave height" shall mean the vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).
 6. The term "clear height under structure" shall mean the vertical dimension from finished floor to lowest point of any part of primary or secondary structure, not including crane supports, located within clear span.

1.4 SYSTEM DESCRIPTION

- A. Metal building systems include complete, integrated sets of mutually dependent components and assemblies, capable of withstanding structural and other loadings, thermally induced movements, and exposure to weather in the area of the Site, without failure or infiltration of water into the building interior. The system includes primary and secondary framing, insulated and non-insulated roof and wall

panels, auxiliary system components and all associated trim, complying with requirements shown and specified, all requirements of the metal building systems manufacturer, and governing authorities having jurisdiction at the Site. The metal building is to include two overhead vehicular doors (framed openings only), personnel doors, and aluminum louvers.

- B. Metal building systems also include all internal reinforcements and supports, fasteners, closure plates, flashing, fascias, and all other components necessary to complete the Work in a manner that provides a completely functioning system supportive of, and integrated with, all building service equipment in compliance with the requirements of governing authorities having jurisdiction at the Site.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Engage a manufacturer specializing in the production of the types and quality of products specified and with a documented record of successful in-service metal building system performance.
2. Manufacturer and Erector/Assembler shall be a member of MBMA and hold AC478 accreditation through IAS. Erector/Assembler shall be an AISC Certified Erector or certified through the PEMB fabricator.
3. Engage a manufacturer who will provide complete technical services including preparation and review of Shop Drawings, including installation methods, and detailing for metal building system components. Where the manufacturer requires additions, or changes to the Contract Documents to facilitate its design and fabrication of system components, these, if made after the prior to the execution of the Contract, shall be made at no cost to Owner and only as acceptable to Engineer.
4. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and at the Site, conducted by a qualified inspection agency. Such inspections and tests shall not relieve Supplier-Erector of responsibility for providing materials and fabrication procedures in compliance with specified requirements. All Special Inspections will be at Owner's expense.

B. Erector Qualifications:

1. Engage a single erector skilled, trained and with successful and documented experience in the installation of metal building systems who is acceptable to the metal building system manufacturer, and with specific skill and successful experience in the erection of the types of components required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:
 - a. Names and telephone numbers of owner, architects, or engineers responsible for projects.
 - b. Approximate contract cost of the metal building system.
 - c. Amount of area installed.

- C. Professional Engineer:
1. Engage a registered professional engineer legally qualified to practice in the jurisdiction where the Project is located and experienced in providing engineering services of the kind indicated.
 2. Responsibilities include, but are not necessarily limited to, the following:
 - a. Carefully reviewing system performance and design criteria stated in the Contract Documents.
 - b. Preparing written requests for clarification or interpretation of performance or design criteria for submittal to Engineer by Supplier-Erector.
 - c. Preparing, or supervising the preparation of design calculations, and reviewing and approving related Shop Drawings prepared by the metal building system manufacturer prior to submission to Engineer; testing plan development, and test-result interpretations; and providing comprehensive engineering analyses verifying compliance of the system with the requirements of the Contract Documents.
 - d. Signing and sealing all calculations, drawings and engineering analyses.
 - e. Certifying that:
 - 1) it has performed the design of the system in accordance with the performance and design criteria stated in the Contract Documents, and
 - 2) the said design conforms to all applicable local, state and federal codes, rules and regulations and to the prevailing standards of practice.
- D. Testing Agency Qualifications: To qualify for approval, an independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated, in accordance with ASTM E329 and as documented according to ASTM E548, without delaying the Work.
- E. Erection and Location Tolerances:
1. Comply with MBMA's "Low Rise Building Systems Manual," Chapter IV, Section 9, "Fabrication and Tolerances."
 2. Roof Panel Installation Tolerances: Shim and align units within installed tolerance as follows:
 - a. Slope and Location: 1/4 inch in 20 feet on lines as indicated, and within 1/8-inch offset of adjoining faces and alignment of matching profiles.
 3. Wall Panel Installation Tolerances: Shim and align units within installed tolerances as follows:
 - a. Level and Plumb: 1/4 inch in 20 feet on location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
 4. Door Installation Tolerances: Fit doors in frames within clearances specified in SDI 122.

F. Source Quality Control:

1. Obtain all metal building system components through a single source and from a single manufacturer.
2. In some cases, incidental accessories necessary to the proper functioning of the specified system or component may not be mentioned in the Specifications. Supplier-Erector shall follow the recommendations of the specified metal building system manufacturer and provide systems and components with all required incidental accessories and component items necessary for the proper functioning of the metal building or other building systems, at no additional expense to Owner. Provide materials matching the specified material and finish of similar items.
3. Do not change material gages, system components or construction details after approval of Shop Drawing by Engineer.
4. Contract Documents establish requirements for metal buildings aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignments, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
5. Provide specified material gages, or heavier gages, if calculations based on performance criteria indicates the need for heavier gage material. Where compliance with performance criteria indicates that materials of lesser gage, or size, may be adequate, provide specified gages and sizes as minimum acceptable standard.
6. Welding:
 - a. Qualify procedures and personnel according to AWS D1.1 and AWS D1.3.2.
 - b. Provide certification that all welders employed on the fabrication of the metal building systems have satisfactorily passed AWS qualification tests within the previous twelve months. Manufacturer shall ensure that all certifications are kept current.
7. Structural Steel: Comply with AISC S335 for design requirements and allowable stresses.
8. Cold-Formed Steel: Comply with AISC SG-671 and AISC SG-911 for design requirements and allowable stresses.

G. Requirements of Regulatory Agencies:

1. Fabricate and label structural framing to comply with special inspection requirements at point of fabrication for welding and other connections required by governing authorities having jurisdiction at the Site.

- H. Mock-Ups:
1. Before installing wall panels, build mock-ups for each required form of construction and finish to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 2. Build mock-ups of the types and of the sizes shown.
 - a. Include wall panel assembly with louver, louver opening framed with metal trim, and insulation with vapor retarder.
 - b. Include all sealants at perimeter of louver and joints of wall.
 3. Incorporate materials and methods of fabrication and installation that are identical with Project requirements.
 4. Obtain Engineer's acceptance of visual qualities, color, erection tolerances and workmanship demonstrated on the mock-ups before start of metal building system Work. Retain and protect mock-ups during construction as a standard for judging completed metal building system Work. Do not alter mock-up after approval by Engineer.
 5. Build as many mock-ups as necessary to achieve Engineer 's acceptance of the metal building systems. Disassemble rejected mock-ups and remove all components from Site. Do not incorporate rejected mock-up components into the Work. Accepted mock-ups may be incorporated into the finished Work.
 6. Metal building systems that do not meet the standard of workmanship approved on the approved sample areas shall be removed and replaced with new material.

1.6 SUBMITTALS

- A. Qualifications Data: Submit qualifications data for the following:
1. Manufacturer.
 - a. Manufacturer Accreditation: Statement that metal building system and components were designed and produced by a manufacturer accredited according to the International Accreditation Service's AC472.
 2. Erector.
 3. Professional engineer.
 4. Test agency.
 5. Welding certificates.
- B. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
1. Structural-steel-framing system.
 2. Metal roof panels.
 3. Metal wall panels.
 4. Flashing and trim.
 5. Doors.
 6. Louvers.
 7. Accessories.

- C. Samples: Submit the following:
1. Manufacturer's full selection of standard colors showing the full range of colors available for each type of product included in the metal building system, that incorporates a factory-applied color finish, for initial selection by Engineer.
 2. 12-inch long by actual width of roof and wall panels, with required finishes.
 3. Engineer's review will be for color and profile, only. Compliance with all other requirements is the responsibility of Supplier-Erector.
- D. Shop Drawings: Submit the following:
1. Completely dimensioned plans, elevations and cross-sections of the metal building system completely coordinated with all required equipment and building service clearances signed and stamped with the seal of a registered professional engineer, as specified. Accurately locate, show, and dimension the following:
 - a. Structural framing system including the center lines of the bottom of all columns. Show complete fabrication of primary and secondary framing. Indicate welds and bolted connections, distinguishing between shop and Site applications. Include transverse cross-sections.
 - b. Complete erection drawings showing locations of sidewall, endwall, and roof framing, covering and trim details, and accessory installation details to clearly indicate the proper assembly of building components. Include plans, elevations, details, and attachments to other Work.
 - c. Show layouts of wall, roof and liner panels on support framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and Site-assembled Work.
 - d. Trim and closures.
 - e. Furnish schedule of doors and frames including finish hardware sets, using the same reference numbers as shown. Include details of reinforcement and installation requirements for finish hardware.
 - h. Louvers.
 - i. All required wall and roof penetrations.
 - j. All roof mounted equipment and curbs, and flashings.
 - k. Auxiliary and accessory components. Include details of ventilators, louvers, gutters and downspouts and similar auxiliary and accessory system components.
 - l. All details shall be drawn at a scale of not less than 1-1/2 inches equal to 12 inches.
 2. Manufacturer's complete product information, specifications and installation instructions for metal building components and accessories. Include material descriptions, dimensions, and profiles of individual system components.
 3. Hard copy printouts of structural analysis calculations required to show compliance with loading requirements, deflection requirements, other anticipated movements in the metal building system, and other system performance criteria specified prepared, signed, and stamped with the seal of

a registered professional engineer, as specified. All calculations and assumptions shall be presented so that Engineer can easily follow the progress and logic of registered professional's structural analysis.

4. Foundations Loads and Anchor-Bolt Plans:
 - a. Drawing showing all vertical and horizontal reactions on foundations due to building columns, including overhead doors. Include direction and location of each load application.
 - b. The magnitude of maximum column reactions on foundations from all critical load combinations shall be tabulated separately.
 - c. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation.
5. Copies of special warranties, as specified.

E. Certificates: Submit the following:

1. Letter of Design Certification: Registered professional engineer who prepares, signs, and stamps their delegated design shall provide a written statement confirming responsibility for the design and attesting that the design prepared meets the performance criteria required by the Contract Documents, the requirements of governing authorities having jurisdiction at the Site, and conforms to prevailing standards of practice. Include the following:
 - a. Name and location of Project.
 - b. Order number.
 - c. Name of manufacturer.
 - d. Name of Supplier-Erector.
 - e. Building dimensions, including width, length, height, and roof slope.
 - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - g. Governing building code and year of edition.
 - h. Design Loads: Include dead load, roof live load, collateral loads, impact loads, roof snow load, deflection, wind loads/speeds and exposure, seismic zone, or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads, such as loading superimposed on the system by erection equipment.
 - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing authorities having jurisdiction.
 - j. Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
2. Welding Certificates: Copies of certificates for welding procedures and personnel, as specified.

F. Test Reports: Submit the following:

1. Material Test Reports: From a qualified testing agency indicating and interpreting test results of steel for compliance with requirements specified.
- G. Closeout Submittals:
1. Maintenance Data: For metal panel finishes and door hardware to include in maintenance manuals.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
1. Deliver components to the Site in manufacturer's original, unopened and undamaged packages, legibly labeled and accurately representing contents, indicating materials and components submitted on approved Shop Drawings.
 2. Package roof and wall panels for protection during transportation and handling.
 3. Clearly identify manufacturer, brand name, contents, color stock number, and order number on each package.
 4. Metal building system components that are damaged during delivery or while being unloaded shall not be stored on Site. Remove such products from Site and replace with new, undamaged material.
 5. Inspect materials, account for the presence of all hardware, auxiliary items and other accessories required for the Work, and reject components differing from approved Samples and Shop Drawings. Immediately remove rejected components from the Site.
 6. Do not open packages or remove markings until packages are inspected and accepted. Packages showing indications of damage that may affect condition of contents will not be acceptable. Packages with illegible or removed labels will be rejected for use in the Work.
- B. Storage of Materials:
1. Store roof and wall panels in a manner that will protect strippable coating from exposure to sun and condensation, with good air circulation around each piece.
 2. Stack metal building system components on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Do not store pallet crates directly on the ground. Provide sufficient clearance between enclosure and system components for air circulation and for protection from wind-blown rain.
 3. Store metal sheets and panels so that water accumulations will drain freely. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage, in an area protected from dirt, weather and from all construction activities. Do not store outside or allow components to become wet or soiled in any way while on Site.
 4. If crated system components become wet, remove all system components from the pallet crate immediately, separate and allow to dry under protective cover meeting the requirements of this Specification.

5. Protect foam-plastic insulation as follows:
 - a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - c. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.
- C. Handling of Materials:
1. Unload, store, and erect roof and wall panels and other metal building system components in a manner that prevents bending, warping, twisting, and surface damage.
 2. Do not subject preformed metal siding and accessory materials to bending or stress. Do not carry or transport panels in the horizontal (flat) position. Hold panels upright on edge when handling.
 3. Do not erect components that become dented, scratched, or damaged in any way. Remove such panels from Site and replace with new, undamaged material at no additional expense to Owner.
 4. Panels that are damaged during erection shall be removed from Site and replaced with new, undamaged material. Damaged panels erected into the finished Work shall be removed immediately.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions:
1. Weather Limitations: Proceed with erection only when weather conditions permit roof and wall panel installation to be performed according to manufacturer's written instructions and warranty requirements.
- B. Site-Measurements:
1. Verify dimensions in areas of erection by taking measurements at the Site before fabrication. Indicate dimensions on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delay.
 2. Where Site-measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating components without Site-measurements. Coordinate supports, adjacent construction, equipment and locations of openings to ensure actual dimensions correspond to dimensions established for metal building system Work.
- C. Protection:
1. Provide continuous protection of materials against damage primarily by storing materials under cover and above ground and away from other construction traffic.
 2. Do not expose plastic insulation to sunlight, except to extent necessary for period of installation and concealment.

3. Protect plastic insulation against ignition at all times. Do not deliver plastic insulation materials to Site before it is required to be built into the Work.

D. Scheduling:

1. Schedule the arrival of metal building system components, auxiliary items and accessories to minimize the time they are stored at the Site before erection.
2. Do not proceed with the erection of metal building systems until Supplier-Erector can provide finished Work complying with all requirements of the Specifications.
3. Where metal building systems require the building-in of plates, inserts, anchors, and other items, furnish required inserts to avoid delay in the Work of other trades. Provide setting drawings, templates, and directions for installation of plates, inserts, and anchors, required by the Work of this Section but installed under other Sections.
4. Coordinate with other Work by furnishing Shop Drawings, inserts and similar items at the appropriate times for proper sequencing of construction without delays.
5. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
6. PEMB erector will not start erection until a survey of installed anchor rods (completed by the General Contractor) has been completed and the locations of all anchor rods have been verified to have been installed per the metal building supplier's provided anchor rod layout and associated details.

E. Preinstallation Conference:

1. Prior to erection of metal building system components and associated Work, Supplier-Erector shall schedule and meet at the Site with the metal building system erector, the installer of each component of associated Work, the installers of substrate construction to receive the metal building systems Work, the installers of other Work in and around metal building system that follows the metal building system Work, including mechanical Work, Engineer and other representatives directly concerned with performance of the Work. Review foreseeable methods and procedures related to the metal building system Work, including but not necessarily limited to, the following:
 - a. Review Project requirements and the Contract Documents.
 - b. Review required submittals, both completed and yet to be completed.
 - c. Review status of mock-ups.
 - d. Review status of foundation work, including approval of surface preparations, structural loading limitations and similar considerations.
 - e. Review construction schedule and availability of materials, tradesmen, equipment, and facilities needed to make progress and avoid delays.
 - f. Review environmental conditions, other Project conditions, and procedures for coping with unfavorable conditions.
 - g. Review regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.

- h. Review procedures needed for protection of metal building systems during the remainder of the construction period.
- i. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.
- j. Review required inspection, testing, and certifying procedures.
- 2. Record the discussions of the conference and the decisions and agreements or disagreements reached, and furnish a copy of the record to each party attending.
- 3. Record all revisions or changes agreed upon, reasons therefor, and parties agreeing or disagreeing with them.
- 4. Reconvene the meeting at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration.

1.9 WARRANTY

- A. General Warranty: The special warranties specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Supplier-Erector under the Contract Documents.
- B. Special Warranties:
 - 1. Coating Wear Warranty: Furnish a written warranty, signed by the manufacturer and running to benefit of Owner, agreeing to replace, for a period of ten years from the date of Substantial Completion, wall, roof and auxiliary system components and accessories finish that shows excessive wear, as specified, and stating that the coil and spray coated polyvinylidene fluoride-based coating specified complies with the following:
 - a. Coating will not blister, peel, flake, check nor chip; and shall also be warranted against excessive color change, chalking and cracking, spalling, crazing, or from otherwise losing adhesion for a period of twenty years from the date of installation, to the extent that such shall create unsightly conditions, impair the intended architectural qualities of the building or otherwise fail to meet performance criteria specified, when viewed from a distance of 5 feet from the item.
 - b. In the event that the coil coated polyvinylidene fluoride-based coating fails to meet the specified standards the manufacturer shall, at his own expense, replace or field paint, at the discretion of Owner, all areas affected by the failure. In the event that repainting is selected, it shall be done at mutually agreeable intervals throughout the term of the warranty.
 - c. The warranty does not apply where any failure is caused by accidents, or any external conditions or forces beyond the control of the manufacturer.
 - 2. Material and Workmanship Warranty: Furnish a written warranty, signed by the manufacturer and running to benefit of Owner, agreeing to replace metal building system components that fail in material or workmanship within three years of the date of Substantial Completion. Failure of materials or

workmanship shall include, but is not limited to, leakage or air infiltration, deflections, or deterioration of metal in excess of normal weathering, and in excess of performance criteria specified; and defects in, and improper arrangement of, the various parts, accessories, weatherstripping, and other components of the system.

3. Standing Seam Roof Panel Weathertightness: Furnish a full coverage no-dollar-limit written warranty on material and workmanship guarantying to pay for all materials and all labor reasonably required to repair the roofing system and to return it to a watertight condition if leaks occur due to ordinary wear and tear, secured by a recognized surety company and executed by an authorized representative of the manufacturer, running to the benefit of Owner, agreeing to replace, for a period of 20-years from the date of Substantial Completion, standing seam metal roof panel assemblies and flashing that fail to remain water- and weather-tight. Supplier-Erector shall obtain all approvals and inspections as may be required by the manufacturer for warranty coverage.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Performance Criteria:

1. General:

- a. Standards: Comply with applicable standards, recommendations and specified publications of MBMA, AISC, and ASCE 7, except to the extent more stringent requirements are specified or required by governing authorities having jurisdiction at the Site.
- b. Modifications: The metal building system requirements shown are based on the specific system shown. Other manufacturer's systems with equal performance characteristics may be considered. Within these limitations Supplier-Erector shall be responsible for the structural adequacy, detailing and fabrication of the entire metal building system, including anchorage, and to make whatever modifications of, and additions to, the details as may be required to fulfill the performance requirements as acceptable to Engineer. Maintain the visual design concept as shown, including member sizes, profiles, support locations and alignment of components, as judged solely by Engineer. Clearly identify, in a manner that is highlighted to Engineer, all proposed substitutions, modifications, variations, unspecified features and "or equal" products. Provide complete comparative data, with specified products, at time of Shop Drawing submission.
- c. Professional engineer, to whom design of the metal building system is delegated, shall prepare written requests for clarification of system performance criteria and for clarification of other requirements of the Contract Documents for Supplier-Erector to submit to Engineer.

2. Metal Building System Design: Provide size, spacing, and spans shown, and as follows:
 - a. Primary Frame Type: Provide the following:
 - 1) Rigid Clear Span: Solid member- structural framing system without interior columns.
 - b. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, as follows:
 - 1) Provide loadbearing -endwall- and corner columns, and rafters.
 - c. Secondary Frame Type: Manufacturer's standard rafters and the following girts:
 - 1) Exterior-framed (bypass) girts.
 - d. Eave Height: Manufacturer's standard height, as indicated by height shown.
 - e. Bay Spacing:
 - 1) Approximately 25 feet at main building, as shown.
 - 2) Approximately 18.66 feet at lean-to, as shown.
 - f. Roof Slope:
 - 1) Match slope of existing building. Approximately 2 inch per 12 inches at main building.
 - 2) 1 inch per 12 inches at lean-to.
 - g. Roof System: Manufacturer's standard insulated, standing-seam, roof panels.
 - 1) Manufacturer's standard, non-insulated, standing-seam, roof panels at lean-to.
 - h. Exterior Wall System: Manufacturer's standard factory-assembled insulated wall panels at main building.
 - 1) Exterior Wall System: Manufacturer's standard, Site-assembled, uninsulated, wall panels at lean-to.
 - j. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1) Design Loads: As shown on drawings.
 - 2) Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations in accordance with applicable Building Code.
 - k. Deflection Limits: Design component assemblies to withstand design loads with deflections no greater than the following:
 - 1) Purlins and Rafters: Vertical deflection of $L/180$ of the span.
 - 2) Girts: Horizontal deflection of $L/180$ of the span.
 - 3) Roof Panels: Vertical deflection of $L/180$ of the span.
 - 4) Wall Panels: Horizontal deflection of $L/180$ of the span.
 - l. Drift: Lateral deflection of the building frame at the roof line in relationship to the position of the floor or slab-on-grade shall be limited to metal building system manufacturer's maximum for type of warranted construction specified, or not greater than allowed by MBMA, whichever is less.

- m. Design secondary framing system to accommodate deflection of primary structure, construction tolerances, and to maintain clearances at openings.
- n. Seismic Performance: Design metal building systems capable of resisting the effects of earthquake motions determined according to governing authorities having jurisdiction at the Site or ASCE 7, whichever is more stringent.
- o. Thermal Movements: Provide metal building roof and wall panel systems designed for thermal movements. Employ detailing and fabrication techniques that prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects resulting from the following maximum change (range) in ambient and surface temperatures. Base design calculation on surface temperatures of materials caused by both solar heat gain and nighttime-sky heat loss.
 - 1) Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.
- p. Thermal Performance: Provide metal building roof and wall assemblies with the following thermal-resistance values (R-value):
 - 1) Roof Assemblies: $R = 35.5$.
 - 2) Wall Assemblies: $R = 14.4$.
- q. Air Infiltration:
 - 1) Roof Panels: Provide roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed roof area when tested according to ASTM E1680 at a static-air-pressure difference of 4 lbf/sq. ft.
 - 2) Wall Panels: Provide wall panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed wall area when tested according to ASTM E283 at a static-air-pressure difference of 4 lbf/sq. ft.
- r. Water Penetration:
 - 1) Roof Panels: Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E1646 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.
 - 2) Wall Panels: Provide wall panel assemblies with no water penetration as defined in the test method when tested according to ASTM E331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.
- s. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for the following wind-uplift resistance:
 - 1) Class 90.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Butler Manufacturing Company.
 - 2. Varco-Pruden Buildings; a United Dominion Company.
 - 3. Or Equal.

2.3 STRUCTURAL FRAMING MATERIALS

- A. Hot-Rolled Structural Shapes: ASTM A36 or A529.
- B. Steel Tubing or Pipe: ASTM A500, Grade B; ASTM A501 or ASTM A53, Grade B.
- C. Steel Plate, Bar or Strip: ASTM A529, A570, or A572.
- D. Structural Steel Sheet: Hot-rolled, ASTM A570, Grade 50 or Grade 55; hot-rolled, ASTM A568; or cold-rolled, ASTM A611, structural quality, matte (dull) finish.
- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, structural quality, Grade 50, with G60 coating designation; mill-phosphatized.
- F. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755 and the following requirements:
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, G90 coating designation; structural quality.
- G. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy, hex-head structural steel bolts, heavy hex carbon steel nuts, and hardened carbon steel washers.
 - 1. Finish: Hot-dip zinc coating, ASTM A153, Class C.
- H. Anchor Rods, Nuts, and Washers:
 - 1. Anchor Rods: ASTM F1554, Grade 55; carbon-steel, heavy hex-head bolts; and heavy hex carbon-steel nuts.
 - 2. Washers: ASTM A36.
- I. Primers: As selected by manufacturer for compatibility with finish paint systems specified in Section 09 91 00, Painting, and capable of providing a sound substrate for Site-applied topcoats, despite prolonged exposure without topcoat protection.

2.4 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755, and the following:
 - 1. Zinc-Coated (Galvanized or Galvalume) Steel Sheet: ASTM A653, G90 coating designation; structural quality.
 - 2. Aluminum Zinc Alloy Coated Steel Sheet: ASTM A792, Class AZ50 coating, Grade 40 structural quality.
 - 3. Aluminum Coated Steel Sheet: ASTM A463, T140 coating.
 - 4. Surface: Smooth, flat, mill finish.
- B. Panel Sealants: Provide the following:
 - 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; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in panels and remain weathertight; and as recommended by metal building system manufacturer.

2.5 INSULATION MATERIALS

- A. Fire-Test-Response Characteristics for Insulation: Provide insulation with the fire-test-response characteristics indicated, as determined by testing identical products in compliance with test methods specified below by a testing and inspecting agency acceptable to governing authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E84.
 - 2. Fire-Resistance Ratings: ASTM E119.
 - 3. Combustion Characteristics: ASTM E136.
- B. Provide insulation materials as specified in Section 07 21 05, Building Insulation.
- C. Mineral-Fiber-Blanket Insulation: Thermal insulation combining slag/rock-wool fibers with thermosetting resins, complying with ASTM C665 and as follows:
 - 1. Type I: Unfaced.

2.6 DOOR AND FRAME MATERIALS

- A. Cold-Rolled Carbon-Steel Sheet: ASTM A366 or ASTM A568, matte finish, suitable for exposed applications, and stretcher-leveled or roller-leveled to stretcher-leveled flatness.
- B. Hot-Rolled Carbon-Steel Sheet: ASTM A568 or ASTM A569.
- C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, commercial-quality, with G60 coating designation; mill-phosphatized.

2.7 AUXILIARY AND ACCESSORY MATERIALS

- A. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound, free of asbestos fibers, sulfur components, and other deleterious impurities.
- B. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, of consistency suitable for application, and with a 30-minute working time.
- C. Shop Primer and Finish Painting: As specified in Section 09 91 00, Painting.

2.8 FABRICATION, GENERAL

- A. Shop-fabricate bearing plates, and other plates as required for building erection, to the required sizes, sections, and profiles, complete with base plates welded in place, and with all required holes for anchoring or connections shop-drilled, or punched, to template dimensions.
 - 1. Shop Connections: Riveted, bolted, or welded.
 - 2. Site Connections: Bolted.
- B. Fabricate components, and necessary field connections required for erection, to permit easy assembly and disassembly. Fabricate components such that once assembled they may be disassembled, repackaged and reassembled with a minimum amount of labor and maximum salvageability.
- C. Clearly and legibly mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
- D. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled at the Site.
- E. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.
- F. Primary Framing:
 - 1. Shop-fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted Site-assembly.
 - 2. Make shop connections by welding or by using high-strength bolts.

3. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
 4. Brace compression flange of primary framing by angles connected between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 5. Weld clips to frames for attaching secondary framing members.
- G. Secondary Framing:
1. Shop-fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place.
 2. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
 3. Make shop-connections by welding or by using non-high-strength bolts.
- H. Shop-Painting: Clean surfaces to be primed of loose mill scale, rust, dirt, oil, grease, and other matter that might interfere with paint bond. Follow procedures and substrate preparation recommendations of the painting manufacturers for the paint systems specified in Section 09 91 00, Painting.
- I. Factory-Priming for Site-Painted Finish: Where Site-painting after installation is shown or specified, apply the specified primer immediately after cleaning and pretreating.

2.9 STRUCTURAL FRAMING FABRICATION

- A. Primary Framing:
1. Provide metal building system manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
 - a. Provide frames with attachment plates, bearing plates, and splice members. Factory drill for Site-bolted assembly. Provide frame span and spacing indicated.
 - b. Slight variations in span and spacing may be acceptable if necessary to meet manufacturer's standard, as approved by Engineer.
 2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural steel shapes.
 3. Frame Configuration: See plans.
 4. Exterior Column Type: Tapered.
 5. Rafter Type: Tapered.
- B. Secondary Framing:
1. Provide metal building system manufacturer's standard structural secondary framing members, including purlins, girts, eave struts, flange bracing, base

members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural steel sheet or roll-formed, metallic-coated steel sheet prepainted with coil coating, unless otherwise shown or specified.

2. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch thick steel sheet, built-up steel plates, or structural steel shapes; minimum 2-1/2-inch wide flanges.
 - a. Depth: 8-inches.
3. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch thick steel sheet, built-up steel plates, or structural steel shapes. Form ends of Z-sections with stiffening lips angled 45 to 50 degrees to flange and with minimum 2-1/2-inch wide flanges.
 - a. Depth: 8-inches.
4. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch thick steel sheet, built-up steel plates, or structural steel shapes; to provide adequate backup for both roof and wall panels.
5. Flange and Sag Bracing: Minimum 1-5/8-inch by 1-5/8-inch structural steel angles, with a minimum thickness of 0.0598-inch, to stiffen primary frame flanges.
6. Base or Sill Angles: Minimum 3-inch by 2-inch by 0.0747-inch thick, zinc-coated (galvanized) steel sheet.
7. Purlin and Girt Clips: Minimum 0.0747-inch thick, zinc-coated (galvanized) steel sheet.
8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0747-inch thick, zinc-coated (galvanized) steel sheet.
9. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch thick, cold-formed, structural steel sheet or structural steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

C. End-Wall Framing:

1. Provide metal building system manufacturer's standard primary end-wall framing fabricated for Site-bolted assembly.
2. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural steel sheet; with minimum thickness of 0.0747-inch.
3. End-Wall Rafters: C-shaped, cold-formed, structural steel sheet; with minimum thickness of 0.0598-inch.

E. Bracing: Provide adjustable wind bracing as follows:

1. Rods: ASTM A36; ASTM A572, Grade D; or ASTM A529, Grade 50; 1/2-inch diameter steel; threaded full length or threaded a minimum of 12 inches at each end.

2. Angles: Fabricated from structural steel shapes to match primary framing, of size required to withstand design loads.
 3. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.
- F. Bolts: Provide shop-painted bolts, unless structural framing components are in direct contact with roof and wall panels. Provide galvanized bolts when structural framing components are in direct contact with roof and wall panels.

2.10 ROOF PANEL FABRICATION

- A. Insulated, Standing Seam, Roof Panels at Main Building Addition: Provide manufacturer's standard factory-assembled units with interior and exterior zinc-coated (galvanized), metallic-coated steel face sheets prepainted with coil-coating, bonded to a foamed-in-place insulating core. Fabricate panels with a weathertight tongue-and-groove side edge for joining panels with a concealed metal clip, a standing seam, and Site-applied sealant, in a manner that will prevent condensation on interior face. Comply with the following:
1. Insulating Core: Manufacturer's standard core consisting of closed-cell, urethane-modified isocyanurate or polyurethane.
 2. Face Sheet Thickness: Provide the following:
 - a. Exterior Face Sheet: 22 gauge.
 - b. Interior Face Sheet: 22 gauge.
 3. Panel Thickness: 5-inches; thermal transfer of 0.025 Btu/sq. ft./h/degree F, maximum. R-Value: R-35.5.
 4. Panel profile and embossing:
 - a. Exterior: Mesa with Trapezoidal Ribs, Non-embossed.
 - b. Interior: Mesa, Non-embossed.
 5. Products and Manufacturers:
 - a. KingSeam Insulated Roof Panels by Kingspan.
 - b. Or Approved Equal.
- B. Uninsulated, Standing-Seam, Roof Panels at Lean-To: Manufacturer's standard panels complying with the following:
1. Vertical-Rib Roof Panels: Fabricate flat-pan panels from metallic-coated steel sheets prepainted with coil-coating, factory-formed to provide 16-inch coverage; with 2-inch high, inverted-L, vertical ribs at panel edges. Design panels for mechanical attachment to roof purlins using concealed clips in side laps. Factory-apply sealant at each interlocking joint. Comply with the following:
 - a. Material: Zinc-coated (galvanized) steel.
 - b. Yield Strength: 50-ksi.
 - c. Metal Thickness: 22 gauge.
 - d. Joint Type: Single-folded, mechanically seamed type.
 - e. Clip System: Floating to accommodate thermal movement.

- C. Roof Panel Auxiliary System Components: Provide components required for a complete roof panel assembly including trim, copings, fascia, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.
1. Closures: Provide closures at eave and ridge, fabricated of same metal as roof panels.
 2. Clips: Minimum 0.0625-inch thick, stainless steel panel clips designed to withstand negative-load requirements.
 3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch thick, stainless steel or nylon-coated aluminum sheet.
 4. Thermal Spacer Blocks: Where panels attach directly to purlins, provide 1-inch thick, thermal spacer blocks; fabricated from extruded polystyrene.
 5. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

2.11 WALL PANEL FABRICATION

- A. Insulated Wall Panels at Main Building Addition: Provide manufacturer's standard factory-assembled units with interior and exterior zinc-coated (galvanized), metallic-coated steel face sheets prepainted with coil-coating, bonded to a foamed-in-place insulating core. Fabricate panels with a weathertight tongue-and-groove side edge for joining panels with a concealed metal clip and Site-applied sealant, in a manner that will prevent condensation on interior face. Comply with the following:
1. Insulating Core: Manufacturer's standard core consisting of closed-cell, urethane-modified isocyanurate or polyurethane.
 2. Face Sheet Thickness: Provide the following:
 - a. Exterior Face Sheet: 22 gauge.
 - b. Interior Face Sheet: 22 gauge.
 3. Panel Thickness: 2-inches; thermal transfer of 0.058 Btu/sq. ft./h/degree F, maximum.
 4. Panel profile and embossing:
 - a. Exterior: Flat, Stucco.
 - b. Interior: Shadowline, Non-embossed.
 5. Products and Manufacturers:
 - a. Optimo Insulated Wall Panels by Kingspan.
 - b. Or Approved Equal.
- B. Uninsulated Wall Panels at Lean-To: Provide manufacturer's standard panels complying with the following:
1. Ribbed Panels: Fabricate from metallic-coated steel sheets prepainted with coil-coating, factory-formed to provide 3-foot coverage, with raised trapezoidal major ribs at 12 inches on centers, and intermediate stiffening ribs symmetrically spaced between major ribs for full length of panel. Design

panels for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges. Comply with the following:

- a. Material: Zinc-coated (galvanized) steel.
- b. Yield Strength: 50-ksi.
- c. Metal Thickness: 0.0299-inch.
- d. Panel Thickness: 1.125-inches.

C. Wall Panel Accessories:

1. Provide components required for a complete wall panel assembly, including trim, copings, mullions, sills, corner units, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

2.12 DOOR AND FRAME FABRICATION

A. Personnel Doors: Provide personnel doors and frames as standard with metal building system manufacturer. Prepare and reinforce doors and frames to receive factory- and Site-applied hardware according to Section 08 71 00, Door Hardware. Comply with the following:

1. Steel Doors: 1-3/4-inches thick; fabricated from 0.0359-inch thick, zinc-coated (galvanized) steel face sheets; of styles indicated. Weld 0.0598-inch thick, inverted zinc-coated (galvanized) steel channels to face sheets at top and bottom of door.
 - a. Core: Polystyrene foam; thermal transfer of 0.16 Btu/sq. ft./h/degrees F, maximum.
 - b. Glass: Low-E, Tinted, Fully Tempered, Insulating, Float Glass Units:
 - 1) Insulating Glass Units: Provide preassembled units consisting of two lites of glass separated by a dehydrated interspace, and complying with ASTM E 2190 for Class C units, permanently and hermetically sealed together at edges with spacers and sealant.
 - 2) System Sealing: Dual seal with polyisobutylene primary sealant and silicone secondary sealant, complying with ASTM C 1249.
 - 3) Overall Unit Thickness: 1 inch.
 - 4) Thickness of Each Glass Lite: 1/4 inch.
 - 5) Outdoor Lite: Tinted, Fully Tempered, float glass, Kind FT.
 - 6) Interspace Content: Argon.
 - 7) Indoor Lite: Clear, Low-E, Fully Tempered, float glass; Kind FT.
 - 8) Low-E Coating: Pyrolytic on third surface.
 - 9) Visible Light Transmittance: 56 percent minimum.
 - 10) Winter Nighttime U-Factor: .35.
 - 11) Summer Daytime U-Factor: 0.35 maximum.
 - 12) Solar Heat Gain Coefficient: 0.35, maximum.
 - 13) Light to Solar Gain Ratio: 1.78
 - 14) Shading Coefficient: 0.41.

- 15) Outdoor Visible Light Reflectance: 12 percent.
- 16) Provide safety glazing labeling.
- 17) Products and Manufacturers: Provide one of the following:
 - i. Sungate 500, Atlantica, Fully Tempered, Insulating Glass by PPG Industries, Incorporated.
 - ii. Energy Advantage, EverGreen, Fully Tempered, Insulating Glass by Pilkington North America, Incorporated.
 - iii. Or equal.
- c. Glazing Frames: Steel frames to receive Site-installed glass.
2. Steel Frames: Fabricate 2-inch wide face frames from 0.0598-inch thick, zinc-coated (galvanized) steel sheet.
 - a. Type: Factory-welded.
3. Finish Hardware: As specified in Section 08 71 00, Door Hardware.
4. Furnish double doors as shown on the drawings, to be installed by the General Contractor.

2.13 AUXILIARY SYSTEM COMPONENTS AND MISCELLANEOUS ACCESSORIES

- A. Accessories shall be as specified in Section 8 of the Recommended Guide Specifications in the MBMA Manual, including gutters and downspouts.
 1. Provide sheet metal accessories of same material and in same finish as roof and wall panels, unless otherwise specified.
- B. Gutters and Downspouts: Provide the manufacturers standard components.
- C. Contour Eave and Gable Trim: Provide the following:
 1. Gable and eave trim shall be contour type fabricated from 26-gage galvanized steel, ASTM A525, G90 coating.
 2. Gable and eave trim shall have a factory applied paint finish.
 3. Install preformed corner closures to match the configuration of the gable and eave trim.
 4. Install preformed rubber weatherseals to completely fill the roof panel corrugation voids prior to installation of eave trim.
 5. Install preformed wall closures to completely fill the wall panel corrugation voids prior to installation of eave and gable trim. Wall closures shall be 26-gage galvanized steel factory painted in slate black.
- D. Flashing and Trim:
 1. Trim and wall panel transitions and other wall accessories for doors and windows and other openings through the metal panels shall be as required to coordinate with doors, window walls and other components specified in other Sections and Contracts.
 2. Provide manufacturer's standard profiles to the extent possible. Custom fabricate profiles where required, or shown, and to accommodate the Work of

other Sections and Contracts. Provide extruded aluminum trim with polyurethane thermal break for all window wall openings.

3. Form flashing and trim from 0.0179-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil-coating.
4. Provide flashing and trim 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 roof or wall panels.
5. Door Jamb Opening Trim: Minimum 0.125-inch thick steel sheet. Trim jambs of door openings.
6. Door Head Opening Trim: Minimum 0.028-inch thick steel sheet. Trim head of door openings, and head, jamb, and sill of other openings.
7. Base Molding Trim: Provide continuous interior base moldings in all perimeter wall areas except toilet rooms, fabricated from 22-gage galvanized steel. Finish shall be slat black. Provide base molding 3-7/8-inches high by 3/4-inch wide with a sloping top.
8. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

E. Personnel Doors, Intake Louvers, Exhaust Fans, and Overhead Door Openings: Provide galvanized steel headers, posts, drip gutters and door post flashing and trim all coordinated with selected metal wall panel system for type and location. Provide size shown.

F. Fasteners:

1. Sheet Panel Fasteners: Manufacturer's standard system of self-tapping screws, bolts and nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.
2. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.
3. Locate and space fastenings for true vertical and horizontal alignment. Use appropriate fastening tools to obtain controlled uniform compression, for positive seal without rupture of neoprene washer.
4. Provide concealed fasteners to the greatest extent possible. Provide exposed fasteners with heads matching color of roofing or siding sheets by means of plastic caps or factory-applied coating. Provide self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Comply with the following:
 - a. Fasteners for Roof and Wall Panels: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of panels.
5. Fasteners for Flashing and Trim: Blind stainless-steel rivets or stainless-steel self-drilling screws with hex washer head.

- G. Closures: Closed-cell, laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match roof and wall panel profile. Provide closure strips where shown or as required to provide weathertight construction.

2.14 WALL, ROOF AND LINER PANELS, AND AUXILIARY WALL AND ROOF PANEL SYSTEM COMPONENTS COATINGS

- A. Comply with NAAMM's standards and recommendations for applying and designating finishes.
- 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 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.
- C. Coating System for Exposed Wall and Roof Panel Surfaces: Manufacturer's standard, multi-coat, system.
 - 1. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D4214; and without fading in excess of five Hunter units.
 - 2. Colors, Textures, and Glosses: As selected by Engineer from manufacturer's complete selection of standard colors, textures, and glosses.
- D. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5-mil.
- E. Protective Coating: Immediately upon completion of the metal siding and roofing finish, apply a transparent, color-coded, strippable-film coating, not less than 1.0-mil dry film thickness, suitable for protection of the finish through completion of erection, and capable of being easily hand-stripped from the surface at that time.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Supplier-Erector shall examine the areas and conditions under which the metal building systems are to be erected and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 PREPARATION

- A. Clean substrates of all substances, including grease, oil, rolling compounds, incompatible primers, and loose mill scale, that may impair bond of materials.
- B. Clean and prepare items to be finished with Site-applied coatings in compliance with Section 09 91 00, Painting.

3.3 ERECTION

- A. Place and secure metal building systems in accordance with approved Shop Drawings, and the Contract Documents.
- B. Do not field cut, drill, or alter structural members without written approval from Engineer.
- C. Set structural framing in locations and to elevations indicated and according to AISC specifications. Maintain structural stability of frame during erection.
- D. Baseplates, Leveling Plates and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting baseplates and bearing plates. Clean bottom surface of baseplates and bearing plates.
 - 1. Set baseplates and bearing plates for structural members on wedges, shims, or setting nuts.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of baseplate or bearing plate before packing with grout.
 - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - a. Comply with manufacturer's written instructions for proprietary grout materials.
- E. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform

bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts. Tighten bolts by turn-of-the-nut method.
- G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts. Hold rigidly to a straight line by sag rods.
1. Provide rake or gable purlins with tight-fitting closure channels and fascia.
 2. Locate and space wall girts coordinated with door and window arrangements and heights.
 3. Provide supplemental framing at entire perimeter of openings, including doors, louvers, ventilators, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where shown. Tighten rod bracing to avoid sag.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to building structural frame.

3.4 ROOF PANEL INSTALLATION

- A. General: Provide roof panels of full length from eave to ridge when possible. Install panels perpendicular to purlins.
1. Field cutting by torch is not permitted.
 2. Rigidly fasten eave end of roof panels and allow ridge end free movement due to thermal expansion and contraction. Pre-drill panels.
 3. Provide weatherseal under ridge cap.
 4. Flash and seal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 5. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in pre-drilled holes.
 6. Use stainless steel fasteners for exterior applications and galvanized fasteners for interior applications.
 7. Locate and space fastenings in true vertical and horizontal alignment.
 8. Install ridge caps as roof panel work proceeds.
 9. Locate panel splices over, but not attached to, structural supports. Stagger panel splices to avoid a four-panel lap splice condition.
- B. Standing Seam Roof Panels: Fasten roof panels to purlins with concealed clips at each standing seam joint. Install clips over top of insulation at location and spacing shown on approved Shop Drawings.
1. Install clips to supports with self-drilling fasteners.

2. Crimp standing seams with manufacturer-approved motorized seamer tool so clip, panel, and factory-applied side-lap sealant are completely engaged.
3. At panel splices, nest panels with minimum 6 inch end lap, sealed with butyl sealant and fastened together by interlocking clamping plates.

3.5 WALL PANEL INSTALLATION

- A. General: Provide panels full height of building when possible. Install panels perpendicular to girts.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 2. Unless otherwise indicated, begin panel installation at corners with center of rib lined up with line of framing.
 3. Site-cutting of wall panels with a torch is not permitted.
 4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.
 5. Fasten flashing and trim around openings and similar elements with self-tapping screws.
 6. When two rows of panels are required, lap panels 4 inches, minimum. Locate panel splices over structural supports.
 7. When building height requires two rows of panels at gable ends, align lap of gable panels over wall panels at eave height.
 8. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 9. Provide weather-resistant escutcheons for pipe and conduit penetrating exterior walls.
 10. Flash and seal wall panels with weather closures under eaves and rakes, along lower panel edges, and at perimeter of all openings.
 11. Apply elastomeric sealant continuously between metal base channel and concrete, and as required for waterproof construction. Handle and apply sealant and backup according to sealant manufacturer's written instructions.
 12. Use stainless steel fasteners for exterior applications and galvanized fasteners for interior applications.
 13. Locate and space fastenings in true vertical and horizontal alignment.
- B. Factory-Assembled, Insulated Panels: Install wall panels on exterior side of girts. Attach panels to supports at each panel joint with concealed clip and fasteners at maximum 42 inches on centers, but spaced not more than as recommended by manufacturer.
- C. Uninsulated Panels: Install wall panels on exterior side of girts. Attach panels to supports with fasteners as recommended by manufacturer.

3.6 INSULATION INSTALLATION

- A. General: Install insulation concurrently with panel installation, according to manufacturer's written instructions and as follows:
 - 1. Set vapor-retarder-faced units with vapor-retarder to warm side of construction, unless otherwise shown. Do not obstruct ventilation spaces, except for firestopping.
 - 2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- B. Blanket Insulation: Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation with both sets of facing tabs sealed to provide a complete vapor retarder. Comply with the following installation method:
 - 1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
 - 2. Board Insulation: Install board insulation in Site-assembled panel construction as shown and according to metal building system manufacturer's written instructions.
 - 3. Retain insulation in place by metal clips and straps or integral pockets within panels, spaced at intervals recommended by insulation manufacturer to hold insulation securely in place. Maintain cavity width between insulation and liner panel of dimension indicated.

3.7 DOOR AND FRAME INSTALLATION

- A. General: Comply with manufacturer's written instructions for installing doors, hardware, operators, and other door components. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant as specified in Section 07 92 00, Joint Sealants.
- B. Personnel Doors and Frames: Install doors and frames straight, level, and plumb. Securely anchor frames to building structure. Set units with maximum 1/8-inch clearance between door and frame at jambs and head and maximum 3/4-inch clearance between door and floor.
- C. Glazing: Clean channel surfaces and prime as recommended by sealant manufacturer. Cut glass to required size for measured opening; provide adequate edge clearance and glass bite all around. Do not install glass that has significant edge damage or other defects.
 - 1. Install setting blocks at quarter points, set in a bed of sealant if heel bead is used. Install spacers inside and out, all around, where liquid or plastic/mastic compounds are used, except on glass sizes smaller than 50 united inches.
 - 2. Replace glass that is broken or damaged to ensure that each piece of exterior glass is airtight and watertight through normal weather and temperature cycles and through normal door and window operation.

- D. Finish Hardware: Install finish hardware as specified in Section 08 71 00, Door Hardware.

3.8 AUXILIARY SYSTEM COMPONENTS AND ACCESSORY INSTALLATION

- A. General: Install gutters, downspouts, ventilators, louvers, and other accessories according to manufacturer's written instructions, with positive anchorage to building and weathertight mounting. Coordinate installation with flashings and other components.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide for thermal expansion of metal units; conceal 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 excessive oil canning, 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 to result in 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 or bayonet-type 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).
 3. Pipe Flashing: Form flashing around pipe penetration and roof panels. Fasten and seal to roof panel as recommended by manufacturer.
 4. Dissimilar Materials: Separate metal from incompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
- C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet on centers using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch 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 on centers in between.
1. Tie downspouts to underground drainage system indicated.

3.9 SITE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform Site quality control testing.
- B. Extent and Testing Methodology: Testing and verification procedures will be required of high-strength bolted connections.
 - 1. Bolted connections will be visually inspected.
 - 2. Field-bolted connections will be tested and verified according to procedures in RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- C. Testing agency will report test results promptly and in writing to Supplier-Erector and Engineer.

3.10 ADJUSTING, CLEANING AND PROTECTION

- A. Doors: After completing installation, lubricate, test, and adjust doors to operate easily, free from warp, twist, or distortion.
- B. Touchup Painting: Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates, as specified in Section 09 91 00, Painting.
- C. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.
 - 1. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

+ + END OF SECTION + +

SECTION 21 05 17

SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes:
 - 1. Sleeves without water stop.
 - 2. Sleeves with water stop.
 - 3. Stack-sleeve fittings.
 - 4. Sleeve-seal systems.
 - 5. Grout.
 - 6. Silicone sealants

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES WITHOUT WATERSTOP

- A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends.
- B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.
- C. Steel Sheet Sleeves: ASTM A653/A653M, 0.0239-inch minimum thickness; hot-dip galvanized, round tube closed with welded longitudinal joint.

2.2 SLEEVES WITH WATERSTOP

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Advance Products & Systems, LLC.
 - 2. CALPICO, Inc.
 - 3. GPT; an EnPro Industries company.
 - 4. Metraflex Company (The).

- B. Manufactured PVC/HDPE steel stainless steel galvanized steel, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

2.3 STACK SLEEVE FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Jay R. Smith Mfg Co; a division of Morris Group International.
 - 2. Wade; a subsidiary of McWane Inc.
 - 3. Zurn Industries, LLC.
- B. Manufactured, Dura-coated or Duco-coated galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.
 - 1. Clamp: Clamping ring with setscrews.

2.4 SLEEVES SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Advance Products & Systems, LLC.
 - 2. CALPICO, Inc.
 - 3. GPT; an EnPro Industries company.
 - 4. Metraflex Company (The).
 - 5. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Designed to form a hydrostatic seal of 20 psig (137 kPa) minimum.
 - 2. Sealing Elements: EPDM-rubber High-temperature-silicone Nitrile (Buna N) interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size.
 - 3. Connecting Bolts and Nuts: Carbon steel, with ASTM B633 coating Stainless steel Stainless steel, Type 316, of length required to secure pressure plates to sealing elements.

2.5 GROUT

- A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000 psi (34.5 MPa), 28-day compressive strength.

- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicne, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Permthane®/Acryl-R®; ITW Polymers Sealants North America.
 - c. Polymeric Systems, Inc.
 - d. Sherwin-Williams Company (The).
 - e. Sika Corporation.
 - f. The Dow Chemical Company.
 - g. Tremco Incorporated.
 2. Standard: ASTM C920, Type S, Grade NS, Class 25, Use NT.
- B. "Silicone, S, P, T, NT: Single-component, 25 100/50, pourable, plus 25 percent and minus 25 percent plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The).
 - b. Pecora Corporation.
 - c. Sika Corporation.
 - d. Tremco Incorporated.
 2. Standard: ASTM C920, Type S, Grade P, Class 25 Class 100/50, Uses T and NT.
- C. Silicone Foam: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Smooth-On.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES - GENERAL

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 3. Using grout or silicone sealant, seal space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.
- E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 INSTALLATION OF SLEEVES WITH WATERSTOP

- A. Sleeves with waterstops are used in concrete slabs and in concrete walls, for a watertight seal around piping. Install sleeve with waterstop as new walls and slabs are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout or silicone sealant, seal space around outside of sleeves.

3.3 INSTALLATION OF STACK SLEEVE FITTINGS

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 - 1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.

2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
 3. Install section of cast-iron soil pipe to extend sleeve to 3 inches above finished floor level.
 4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 5. Using waterproof silicone sealant, seal space between top hub of stack-sleeve fitting and pipe.
- B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- or smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.4 INSTALLATION OF SLEEVE SEAL SYSTEMS

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building, and passing through exterior walls.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
 2. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.
- B. Prepare test and inspection reports.

3.6 SLEEVE SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
1. Exterior Concrete Walls above and below Grade:
 - a. Sleeves with water stops.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 2. Concrete Slabs-on-Grade:
 - a. Sleeves with water stops.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:
 - a. Sleeves with water stops or stack-sleeve fittings.
4. Interior Walls and Partitions:
 - a. Sleeves without water stops.

+ + END OF SECTION + +

SECTION 21 05 23

GENERAL DUTY VALVES FOR WATER BASED FIRE SUPPRESSION PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Two-piece ball valves with indicators.
 - 2. Bronze butterfly valves with indicators.
 - 3. Iron butterfly valves with indicators.
 - 4. Check valves.
 - 5. NRS gate valves.
 - 6. Trim and drain valves.

1.2 DEFINITIONS

- A. NRS: Non rising stem.
- B. SBR: Styrene-butadiene rubber.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of valve.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and weld ends.
 - 3. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.
- D. Protect flanges and specialties from moisture and dirt.

PART 2 – PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of valve from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:
 - 1. Fire Main Equipment: HAMV - Main Level.
 - a. Ball Valves, System Control: HLUG - Level 3.
 - b. Butterfly Valves: HLXS - Level 3.
 - c. Check Valves: HMER - Level 3.
 - d. Gate Valves: HMRZ - Level 3.
 - 2. Sprinkler System and Water Spray System Devices: VDGT - Main Level.
 - a. Valves, Trim and Drain: VQGU - Level 1.
- B. NFPA 13 Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:
 - 1. Automated Sprinkler Systems:
 - a. Valves.
 - 1) Check valves
 - 2) Miscellaneous valves.
- C. ASME Compliance:
 - 1. ASME B1.20.1 for threads for threaded-end valves.
 - 2. ASME B16.1 for flanges on iron valves.
 - 3. ASME B31.9 for building services piping valves.
- D. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.
- E. NFPA Compliance for valves:
 - 1. Comply with NFPA 13, NFPA 14, NFPA 20, and NFPA 24.
- F. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher, as required by system pressures.
- G. Valve Sizes: Same as upstream piping unless otherwise indicated.
- H. Valve Actuator Types:
 - 1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
 - 2. Handwheel: For other than quarter-turn trim and drain valves.
 - 3. Hand lever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.3 TWO-PIECE BALL VALVES WITH INDICATORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers

offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ames Fire & Waterworks; A WATTS Brand.
2. NIBCO INC.
3. Victaulic Company.

B. Description:

1. UL 1091, except with ball instead of disc approved for indicating valves (butterfly or ball type), Class Number 1112.
2. Minimum Pressure Rating: 175 psig.
3. Body Design: Two piece.
4. Body Material: Forged brass or bronze.
5. Port Size: Full or standard.
6. Seats: PTFE.
7. Stem: Bronze or stainless steel.
8. Ball: Chrome-plated brass.
9. Actuator: Worm gear
10. Supervisory Switch: Internal or external.
11. End Connections for Valves NPS 1 through NPS 2: Threaded ends.
12. End Connections for Valves NPS 2-1/2: Grooved ends.

2.4 BRONZE BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ALEUM USA.
2. Globe Fire Sprinkler Corporation.
3. Milwaukee Valve Company.

B. Description:

1. Standard: UL 1091 standard for indicating valves, (butterfly or ball type), Class Number 1112.
2. Minimum: Pressure rating: 175 psig.
3. Body Material: Bronze.
4. Seat Material: EPDM.
5. Stem Material: Bronze or stainless steel.
6. Disc: Stainless steel with EPDM coating.
7. Actuator: Worm gear.
8. Supervisory Switch: Internal or external.
9. Ends Connections for Valves NPS 1 through NPS 2: Threaded ends.
10. Ends Connections for Valves NPS 2-1/2: Grooved ends.

2.5 IRON BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not

limited to, the following:

1. ALEUM USA.
2. Anvil International.
3. Globe Fire Sprinkler Corporation.
4. Kennedy Valve Company; a division of McWane, Inc.
5. NIBCO INC.
6. Tyco by Johnson Controls Company.
7. Victaulic Company.
8. Zurn Industries, LLC.

B. Description:

1. Standard: UL 1091 standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig.
3. Body Material: Cast or ductile iron with nylon, EPDM, epoxy, or polyamide coating.
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, nickel plated and EPDM or SBR coated.
7. Actuator: Worm gear.
8. Supervisory Switch: Internal or external.
9. Body Design: Lug or wafer Grooved-end connections.

2.6 CHECK VALVES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ALEUM USA.
2. Ames Fire & Waterworks; A WATTS Brand.
3. Anvil International.
4. FEBCO; A WATTS Brand.
5. Fire Protection Products, Inc.
6. Globe Fire Sprinkler Corporation.
7. Kennedy Valve Company; a division of McWane, Inc.
8. Matco-Norca.
9. Mueller Co.
10. NIBCO INC.
11. Reliable Automatic Sprinkler Co., Inc. (The).
12. Shurjoint; a part of Aalberts Integrated piping Systems.
13. Tyco by Johnson Controls Company.
14. United Brass Works, Inc.
15. Venus Fire Protection Ltd.
16. Victaulic Company.
17. Viking Corporation.
18. WATTS.
19. Wilson & Cousins Inc.

B. Description:

1. Standard: UL 312 standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig.
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel with elastomeric seal.
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.7 NRS GATE VALVES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Cast Iron Pipe Company.
2. Clow Valve Company; a subsidiary of McWane, Inc.
3. Kennedy Valve Company; a division of McWane, Inc.
4. Mueller Co.
5. NIBCO INC.
6. Victaulic Company.

B. Description:

1. Standard: UL 262 standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron with elastomeric coating.
5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Flanged Grooved Threaded.

2.8 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
 - b. Fire Protection Products, Inc.
 - c. Fire-End & Croker Corporation.
 - d. Flowserve Corporation.
 - e. FNW; Ferguson Enterprises, Inc.
 - f. Jomar Valve.

- g. KITZ Corporation.
- h. Legend Valve & Fitting, Inc.
- i. Metso Automation USA Inc.
- j. Milwaukee Valve Company.
- k. NIBCO INC.
- l. Potter Roemer LLC; a Division of Morris Group International.
- m. Red-White Valve Corp.
- n. Tyco by Johnson Controls Company.
- o. Victaulic Company.
- p. WATTS.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Design: Two piece.
 - c. Body Material: Forged brass or bronze.
 - d. Port size: Full or standard.
 - e. Seats: PTFE.
 - f. Stem: Bronze or stainless steel.
 - g. Ball: Chrome-plated brass.
 - h. Actuator: Hand lever.
 - i. End Connections for Valves NPS 1 through NPS 2-1/2: Threaded ends.
 - j. End Connections for Valves NPS 1-1/4 and NPS 2-1/2: Grooved ends.

B. Angle Valves:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire Protection Products, Inc.
 - b. NIBCO INC.
 - c. United Brass Works, Inc.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Brass or bronze.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. NIBCO INC.
 - b. United Brass Works, Inc.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Bronze with integral seat and screw-in bonnet.

- c. Ends: Threaded.
- d. Stem: Bronze.
- e. Disc Holder and Nut: Bronze.
- f. Disc Seat: Nitrile.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION, GENERAL

- A. Comply with requirements in the following Sections for specific valve-installation requirements and applications:
 - 1. Section 211313 "Wet-Pipe Sprinkler Systems" for application of valves in wet-pipe, fire-suppression sprinkler systems.
 - 2. Section 211316 "Dry-Pipe Sprinkler Systems" for application of valves in dry-pipe, fire-suppression sprinkler systems.
 - 3. Section 331415 "Site Water Distribution Piping" for application of valves in fire-suppression water-service piping.
- B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply, except from fire-department connections. Install permanent identification signs, indicating portion of system controlled by each valve.
- C. Install double-check valve assembly in each fire-protection water-supply connection.

- D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.
- E. Install valves in horizontal piping with stem at or above the pipe center.
- F. Install valves in position to allow full stem movement.
- G. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

+ + END OF SECTION + +

SECTION 21 05 29

HANGERS AND SUPPORTS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

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. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Fastener systems.
 - 5. Equipment supports.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Section 210516 "Expansion Fittings and Loops for Fire-Suppression Piping" for pipe guides and anchors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers.
 - 2. Metal framing systems.
 - 3. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.
 - 2. Include design calculations for designing trapeze hangers.

1.4 QUALITY ASSURANCE

- A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.
- B. Structural Performance: Hangers and supports for fire-suppression piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. NFPA Compliance: Comply with NFPA 13.
- D. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: Factory-fabricated components, NFPA approved, or UL listed for fire-suppression piping support.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot-dip galvanized.
 - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel stainless steel Insert material.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, or UL-listed, carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. B-line, an Eaton business.
 - b. Flex-Strut Inc.
 - c. G-Strut.
 - d. Haydon Corporation.
 - e. Thomas & Betts Corporation; A Member of the ABB Group.
 - f. Unistrut; Part of Atkore International.
 - g. Wesanco, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel Insert material channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.
6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel Insert material.
8. Metallic Coating: No coating Plain Pregalvanized G90 Electroplated zinc Hot-dip galvanized Gold (yellow zinc dichromate) galvanized.
9. Paint Coating: Green epoxy, acrylic, or urethane Insert paint type.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International.
 - b. CADDY; a brand of nVent.
 - c. Carpenter & Paterson, Inc.
 - d. Empire Industries, Inc.
 - e. PHD Manufacturing, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel Insert material channel with inturned lips.
5. Channel Width: Select for applicable load criteria.
6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel Insert material.

8. Metallic Coating: No coating Plain Pregalvanized G90 Hot-dip galvanized.
9. Paint Coating: Green epoxy, acrylic, or urethane Insert paint coating.

2.5 THERMAL HANGER-SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. CADDY; a brand of nVent.
 2. Carpenter & Paterson, Inc.
 3. National Pipe Hanger Corporation.
 4. Pipe Shields Inc.
 5. Piping Technology & Products, Inc.
 6. Rilco Manufacturing Co., Inc.
 7. Value Engineered Products, Inc.
- B. Insulation-Insert Material: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psi ASTM C552, Type II cellular glass with 100-psi or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: NFPA-approved, UL-listed, threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - c. MKT Fastening, LLC.
 - d. Simpson Strong-Tie Co., Inc.
- B. Mechanical-Expansion Anchors: NFPA-approved, UL-listed, insert-wedge-type anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. B-line, an Eaton business.
 - b. Empire Tool and Manufacturing Co., Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - e. MKT Fastening, LLC.
2. Indoor Applications: Zinc-coated or Stainless steel.
3. Outdoor Applications: Stainless steel.

2.7 EQUIPMENT SUPPORTS

- A. Description: NFPA-approved, UL-listed welded, shop- or field-fabricated equipment support, made from structural-carbon-steel shapes.

2.8 MATERIALS

- A. Aluminum: ASTM B221.
- B. Carbon Steel: ASTM A1011/A1011M.
- C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; black and galvanized.
- D. Stainless Steel: ASTM A240/A240M.
- E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.
 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 – EXECUTION

3.1 APPLICATION

- A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.
- B. 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 shall be weight of supported components plus [200 lb].

3.2 INSTALLATION OF HANGERS AND SUPPORTS

- A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A36/A36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal strut systems.
- D. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
 - 2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.

- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.3 INSTALLATION OF EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 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 welding flux immediately.
 - 4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touchup:
 - 1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
 - 2. Cleaning and touchup painting of field welds, bolted connections, and abraded, shop-painted areas on miscellaneous metal are specified in Section 099113 "Exterior Painting.", Section 099123 "Interior Painting."
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.7 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports metal framing systems and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel and corrosion-resistant attachments for hostile environment applications.
- G. Use thermal hanger-shield inserts for insulated piping and tubing.
- H. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.

2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS 24 if little or no insulation is required.
 3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
- I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- J. Hanger-Rod Attachments: Comply with NFPA requirements.
- K. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. C-Clamps (MSS Type 23): For structural shapes.
 3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- L. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.
- M. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

- N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- O. Use powder-actuated fasteners mechanical-expansion anchors instead of building attachments where required in concrete construction.

+ + END OF SECTION + +

SECTION 21 05 53

IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

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. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Stencils.
 - 5. Valve tags.
 - 6. Warning tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.
- D. Valve Schedules: Valve numbering scheme.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - a. Brady Corporation.

- b. Brimar Industries, Inc.
 - c. Carlton Industries, LP.
 - d. Champion America.
 - e. Craftmark.
 - f. emedco.
 - g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services Inc.
 - j. Seton Identification Products.
 - 3. Material and Thickness: Brass, 0.032 inch, stainless steel, 0.025 inch, aluminum, 0.032 inch or anodized aluminum, 0.032 inch thick, with predrilled holes for attachment hardware.
 - 4. Letter Color: Black or Red.
 - 5. Background Color: White.
 - 6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 8. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - a. Brady Corporation.
 - b. Brimar Industries, Inc.
 - c. Carlton Industries, LP.
 - d. Champion America.
 - e. Craftmark.
 - f. emedco.
 - g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services Inc.
 - j. Seton Identification Products.
 - 3. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch or 1/8 inch thick, with predrilled holes for attachment hardware.
 - 4. Letter Color: Black or Red.
 - 5. Background Color: White.
 - 6. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

7. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 8. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 9. Fasteners: Stainless-steel or self-tapping screws.
 10. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- D. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
1. Brady Corporation.
 2. Brimar Industries, Inc.
 3. Carlton Industries, LP.
 4. Champion America.
 5. Craftmark.
 6. emedco.
 7. LEM Products Inc.
 8. Marking Services Inc.
 9. National Marker Company.
 10. Seton Identification Products.
 11. Stranco, Inc.
- C. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch or 1/8 inch thick, with predrilled holes for attachment hardware.
- D. Letter Color: Black or Red.

- E. Background Color: White.
- F. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- G. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- H. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- I. Fasteners: Stainless-steel rivets or self-tapping screws.
- J. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- K. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - 1. ActionCraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
 - 2. Brady Corporation.
 - 3. Brimar Industries, Inc.
 - 4. Carlton Industries, LP.
 - 5. Champion America.
 - 6. Craftmark.
 - 7. emedco.
 - 8. Kolbi Pipe Marker Co.
 - 9. LEM Products Inc.
 - 10. Marking Services Inc.
 - 11. Seton Identification Products.
- C. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction according to ASME A13.1.
- D. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- E. Self-adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

- F. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: Size letters according to ASME A13.1 for piping.
- G. Pipe-Label Colors:
 - 1. Background Color: Safety Red.
 - 2. Letter Color: White.

2.4 STENCILS

- A. Stencils for Piping:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - a. Brimar Industries, Inc.
 - b. Carlton Industries, LP.
 - c. Champion America.
 - d. Craftmark.
 - e. Kolbi Pipe Marker Co.
 - f. Marking Services Inc.
 - 3. Lettering Size: Size letters according to ASME A13.1 for piping.
 - 4. Stencil Material: Aluminum.
 - 5. Stencil Paint: Safety Red, exterior, gloss, alkyd enamel, or acrylic enamel . Paint may be in pressurized spray-can form.
 - 6. Identification Paint: White, exterior, alkyd enamel or acrylic enamel. Paint may be in pressurized spray-can form.

2.5 VALVE TAGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - 1. ActionCraft Products, Inc.
 - 2. Brady Corporation.
 - 3. Brimar Industries, Inc.
 - 4. Carlton Industries, LP.
 - 5. Champion America.
 - 6. Craftmark.

7. emedco.
 8. Kolbi Pipe Marker Co.
 9. LEM Products Inc.
 10. Marking Services Inc.
 11. Seton Identification Products.
- C. Description: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.
1. Tag Material: Brass, 0.032 inch stainless steel, 0.025 inch aluminum, 0.032 inch or anodized aluminum, 0.032 inch thick, with predrilled holes for attachment hardware.
 2. Fasteners: Brass wire-link chain beaded chain or S-hook.
- D. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
1. Brady Corporation.
 2. Brimar Industries, Inc.
 3. Carlton Industries, LP.
 4. Champion America.
 5. Craftmark.
 6. emedco.
 7. Kolbi Pipe Marker Co.
 8. LEM Products Inc.
 9. Marking Services Inc.
 10. Seton Identification Products.
- C. Description: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
1. Size: 3 by 5-1/4 inches minimum.
 2. Fasteners: Brass grommet and wire Reinforced grommet and wire or string.
 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 4. Color: Safety Yellow background with black lettering.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Piping: Painting of piping as required by code and local AHJ.
- B. Stenciled Pipe-Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, on each piping system.
 - 1. Identification Paint: Use for contrasting background.
 - 2. Stencil Paint: Use for pipe marking.
- C. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit a view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes including pipes where flow is allowed in both directions.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:
 1. Valve-Tag Size and Shape:
 - a. Wet-Pipe Sprinkler System: 1-1/2 inches, square.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

+ + END OF SECTION + +

SECTION 21 11 19

FIRE-DEPARTMENT CONNECTIONS

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. Exposed-type fire-department connections.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department connection.

PART 2 - PRODUCTS

2.1 EXPOSED-TYPE FIRE-DEPARTMENT CONNECTION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
 - 1. American Fire Hose & Cabinet.
 - 2. Elkhart Brass Mfg. Company, Inc.
 - 3. Fire-End & Croker Corporation.
 - 4. Fire Protection Products, Inc.
 - 5. GMR International Equipment Corporation.
 - 6. Guardian Fire Equipment, Inc.
 - 7. Venus Fire Protection Ltd.
 - 8. Wilson & Cousins Inc.
- C. Standard: UL 405.
- D. Type: Exposed, projecting, for wall mounting.

- E. Pressure Rating: 175 psig minimum.
- F. Body Material: Corrosion-resistant metal.
- G. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
- H. Caps: Brass, lugged type, with gasket and chain.
- I. Escutcheon Plate: Round, brass, wall type.
- J. Outlet: Back, with pipe threads.
- K. Number of Inlets: Two.
- L. Escutcheon Plate Marking: Similar to "AUTO SPKR"
- M. Finish: Rough brass
- N. Outlet Size: NPS 4

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire-department connections.
- B. Examine roughing-in for fire-suppression standpipe system to verify actual locations of piping connections before fire-department connection installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall-type fire-department connections.
- B. Install automatic (ball-drip) drain valve at each check valve for fire-department connection.

+ + END OF SECTION + +

SECTION 21 13 13

WET-PIPE SPRINKLER SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel pipe and fittings.
 - 2. Cover system for sprinkler piping.
 - 3. Specialty valves.
 - 4. Air vent.
 - 5. Sprinkler piping specialties.
 - 6. Sprinklers.
 - 7. Alarm devices.
 - 8. Pressure gauges.
- B. Related Requirements:
 - 1. Section 211119 "Fire Department Connections" for exposed -type fire department connections.
 - 2. Section 331415 "Site Water Distribution Piping" for fire water-service backflow prevention devices.

1.2 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.
- C. Delegated Design Submittals: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation or prepared by NICET Level III-certified technician, "Water-Based Systems Layout."

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Sprinkler system plans and sections, or Building Information Model (BIM), drawn to scale, showing the items described in this Section and coordinated with all building trades.
- B. Design Data: Approved sprinkler piping working plans, prepared according to NFPA 13, including documented approval by authorities having jurisdiction, and including hydraulic calculations if applicable.
- C. Field Test Reports:
 - 1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
 - 2. Fire-hydrant flow test report.
- D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.6 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. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by qualified professional engineer or NICET Level III-certified technician, "Water-Based Systems Layout."
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1.8 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of sprinkler service.
 - 2. Do not proceed with interruption of sprinkler service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 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.
- B. Sprinkler system equipment, specialties, accessories, installation, and testing to comply with NFPA 13.
- C. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- D. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.
 - 1. Available fire-hydrant flow test records indicate the following conditions:
 - a. Date: 6/21/2023.
 - b. Performed by: Veolia
 - c. Location of Residual Fire Hydrant R: Hydrant 20-55
 - d. Location of Flow Fire Hydrant F: Hydrant 20-46
 - e. Static Pressure at Residual Fire Hydrant R: 80 psig.
 - f. Measured Flow at Flow Fire Hydrant F: 960 gpm.
 - g. Residual Pressure at Residual Fire Hydrant R: 70 psig.
 - 2. Margin of Safety for Available Water Flow and Pressure: 5 PSI, including losses through water-service piping, valves, and backflow preventers.
 - 3. Sprinkler Occupancy Hazard Classifications:
 - a. Automobile Parking: Ordinary Hazard, Group 1
 - b. Mechanical Equipment Rooms: Ordinary Hazard, Group 1
 - c. Repair Garages: Ordinary Hazard, Group 2
 - 4. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm/sq. ft. over 1950 sq. ft. area.
 - 5. Maximum protection area per sprinkler according to UL listing.
 - 6. Maximum Protection Area per Sprinkler:
 - a. Parking/Garage Areas: 130 sq. ft..
 - b. Other Areas: According to NFPA 13 recommendations unless otherwise

indicated.

- E. Obtain documented approval of sprinkler system design from authorities having jurisdiction.

2.2 STEEL PIPE AND FITTINGS

- A. Standard-Weight Steel Pipe: Galvanized- black-steel pipe, ASTM A53/A53M, Type E Insert type, Grade B Insert grade. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 10, Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.
- C. Steel Pipe Nipples: Galvanized black steel, ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.
- D. Steel Couplings: Galvanized uncoated steel, ASTM A865/A865M, threaded.
- E. Malleable- or Ductile-Iron Unions: UL 860.
- F. Cast-Iron Flanges: ASME 16.1, Class 125.
- G. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
 - 1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick ASME B16.21, nonmetallic and asbestos free EPDM rubber gasket.
 - a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
 - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
 - 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- H. Steel Welding Fittings: ASTM A234/A234M and ASME B16.9.
 - 1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- I. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
 - b. CPS Products, Inc.
 - c. National Fittings, Inc.
 - d. Shurjoint; a part of Aalberts Integrated piping Systems.

- e. Smith-Cooper International.
 - f. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - g. Victaulic Company.
 - 2. Pressure Rating: 175-psig 250-psig 300-psig minimum.
 - 3. Grooved-End Fittings for Steel Piping: Galvanized Painted Uncoated grooved-end fittings, ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
- J. Steel Pressure-Seal Fittings: UL 213, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.
- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Victaulic Company.
 - b. Viega LLC.

2.3 SPECIALTY VALVES

- A. Listed in UL's "Fire Protection Equipment Directory"
- B. Pressure Rating:
 - 1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
- C. Body Material: Cast or ductile iron.
- D. Size: Same as connected piping.
- E. End Connections: Flanged or grooved.
- F. Alarm Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Globe Fire Sprinkler Corporation.
 - b. Reliable Automatic Sprinkler Co., Inc. (The).
 - c. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - d. Venus Fire Protection Ltd.
 - e. Victaulic Company.
 - f. Viking Group Inc.
 - 2. Standard: UL 193.
 - 3. Design: For horizontal or vertical installation.

4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gauges and fill-line attachment with strainer.
5. 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.

G. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reliable Automatic Sprinkler Co., Inc. (The).
 - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
2. Standard: UL 1726.
3. Pressure Rating: 175-psig minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.4 AIR VENT

A. Manual Air Vent/Valve:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. National Fittings, Inc.
 - c. Shurjoint; a part of Aalberts Integrated piping Systems.
 - d. Victaulic Company.
2. Description: Ball valve that requires human intervention to vent air.
3. Body: Forged brass.
4. Ends: Threaded.
5. Minimize Size: 1/2 inch.
6. Minimum Water Working Pressure Rating: 300 psig.

B. Automatic Air Vent:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. CLA-VAL.
 - c. Engineered Corrosion Solutions.
 - d. Metraflex Company (The).
 - e. Val-Matic Valve & Manufacturing Corp.
2. Description: Automatic air vent that automatically vents trapped air without human intervention.
3. Standard: UL listed for use in wet-pipe fire sprinkler systems.

4. Vents oxygen continuously from system.
5. Float valve to prevent water discharge.
6. Minimum Water Working Pressure Rating: 175 psig.

C. Automatic Air Vent Assembly:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. Engineered Corrosion Solutions.
 - c. Potter Electric Signal Company, LLC.
 - d. South-Tek Systems, LLC.
2. Description: Automatic dual air vent assembly that automatically vents trapped air without human intervention, including Y-strainer and ball valve in a pre-piped assembly.
3. Standard: UL listed for use in wet-pipe fire sprinkler system.
4. Vents oxygen continuously from system.
5. Float valve to prevent water discharge.
6. Minimum Water Working Pressure Rating: 175 psig.

2.5 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
 - c. National Fittings, Inc.
 - d. Shurjoint; a part of Aalberts Integrated piping Systems.
 - e. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - f. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175-psig minimum 300 psig.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-tee and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. Reliable Automatic Sprinkler Co., Inc. (The).
 - c. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory"
3. Pressure Rating: 175-psig minimum 300 psig.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. Elkhart Brass Mfg. Co., Inc.
 - c. Fire-End & Croker Corporation.
 - d. Potter Electric Signal Company, LLC.
 - e. Potter Roemer LLC; a Division of Morris Group International.
2. Standard: UL 199.
3. Pressure Rating: 175 psig.
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing, Inc.
 - b. Triple R Specialty.
 - c. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - d. Victaulic Company.
 - e. Viking Group Inc.
2. Standard: UL's "Fire Protection Equipment Directory"
3. Pressure Rating: 175-psig minimum 300 psig.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aegis Technologies, Inc.
 - b. CECA, LLC.
 - c. CPS Products, Inc.
 - d. Merit Manufacturing.
2. Standard: UL 1474.
3. Pressure Rating: 250-psig minimum 300 psig.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ALEUM USA.
 - b. FlexHead Industries, Inc.
 - c. Gateway Tubing, Inc.
 - d. Victaulic Company.
2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 175-psig minimum 300 psig.
5. Size: Same as connected piping, for sprinkler.

2.6 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc. (The).
3. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
4. Venus Fire Protection Ltd.
5. Victaulic Company.
6. Viking Group Inc.

B. Listed in UL's "Fire Protection Equipment Directory"

C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

D. Automatic Sprinklers with Heat-Responsive Element:

1. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- E. Open Sprinklers with Heat-Responsive Element Removed: UL 199.
1. Nominal Orifice:
 - a. 1/2 inch, with discharge coefficient K between 5.3 and 5.8
- F. Sprinkler Finishes: Chrome plated bronze painted.
- G. Special Coatings: Wax lead corrosion-resistant paint
- H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Steel, one piece, flat steel, two piece, with 1-inch vertical adjustment Plastic, finish per design documents.
- I. Sprinkler Guards:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reliable Automatic Sprinkler Co., Inc. (The).
 - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - c. Victaulic Company.
 - d. Viking Group Inc.
 2. Standard: UL 199.
 3. Type: Wire cage with fastening device for attaching to sprinkler.

2.7 ALARM DEVICES

- A. Alarm-device types to match piping and equipment connections.
- B. Electrically Operated Notification Appliances:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms; Honeywell International, Inc.
 - b. Notifier; Honeywell International, Inc.
 - c. Potter Electric Signal Company, LLC.
 2. Electric Bell:
 - a. Standard: UL 464.
 - b. Type: Vibrating, metal alarm bell.
 - c. Size: 6-inch minimum- diameter.
 - d. Voltage: 120 V ac, 60 Hz, 1 phase 24 V dc.

- e. Finish: Red-enamel or polyester powder-coat factory finish, suitable for outdoor use with approved and listed weatherproof backbox.

C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ADT Security Services, Inc.
 - b. ITT McDonnell & Miller.
 - c. Potter Electric Signal Company, LLC.
 - d. System Sensor.
 - e. Viking Group Inc.
 - f. Watts Water Technologies; a Watts company.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig.
7. Design Installation: Horizontal or vertical.

D. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Barksdale, Inc.
 - b. Detroit Switch, Inc.
 - c. Potter Electric Signal Company, LLC.
 - d. System Sensor.
 - e. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
 - f. United Electric Controls Co.
 - g. Viking Group Inc.
2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

E. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms; Honeywell International, Inc.
 - b. Potter Electric Signal Company, LLC.

- c. System Sensor.
- 2. Standard: UL 346.
- 3. Type: Electrically supervised.
- 4. Components: Single-pole, double-throw switch with normally closed contacts.
- 5. Design: Signals that controlled valve is in other than fully open position.
- 6. 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.

2.8 PRESSURE GAUGES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AGF Manufacturing, Inc.
 - 2. AMETEK, Inc.
 - 3. Ashcroft Inc.
 - 4. Brecco Corporation.
 - 5. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gauge Range: 0- to 250-psig minimum 0 to 300 psig.
- E. Label: Include "WATER" label on dial face.

PART 3 – EXECUTION

2.8 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.\

3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Section 331415 "Site Water Distribution Piping" for exterior piping.
- B. Install shutoff valve, pressure gauge, drain, and other accessories indicated at connection to water-service piping.

- C. Install shutoff valve, check valve, pressure gauge, and drain at connection to water service.

3.3 INSTALLATION OF PIPING

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- J. Install alarm devices in piping systems.
- K. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they are not subject to freezing.
- L. Fill sprinkler system piping with water.

- M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

3.4 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- J. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts.

Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

- K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- L. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- M. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.5 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

- A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and NFPA 13 for supports.

3.6 INSTALLATION OF VALVES AND SPECIALTIES

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. Install valves in vertical position for proper direction of flow, in main supply to system.
- E. Air Vent:
 - 1. Provide at least one air vent at high point in each wet-pipe sprinkler system in accordance with NFPA 13 requirements. Connect vent into top of fire sprinkler piping.
 - 2. Provide dielectric union for dissimilar metals, ball valve, and strainer upstream of automatic air vent.
 - 3. Pipe from outlet of air vent to drain.

3.7 INSTALLATION OF SPRINKLERS

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.8 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Coordinate with fire-pump tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.10 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.12 PIPING SCHEDULE

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded or grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2 and Smaller, to Be One of the Following:
 - 1. Thinwall Schedule 10 nonstandard OD, thinwall hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Thinwall Schedule 10 hybrid black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
 - 3. Thinwall Schedule 10 nonstandard OD, thinwall hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
- D. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2-1/2 to NPS 4, to Be One of the Following:
 - 1. Thinwall Schedule 10 nonstandard OD, thinwall hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Thinwall Schedule 10 nonstandard OD, thinwall hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
- E. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 5 and Larger, to Be One of the Following:
 - 1. Thinwall Schedule 10 hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Thinwall Schedule 10 hybrid black-steel pipe with plain ends; welding fittings; and welded joints.

3.13 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers
 - 2. Spaces Subject to Freezing: Pendent, dry sprinklers or Sidewall, dry sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Upright, and Pendent Sprinklers: Brass plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

+ + END OF SECTION + +

SECTION 21 13 16

DRY-PIPE SPRINKLER 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 Include:
 - 1. Pipes, fittings, and specialties.
 - 2. Specialty valves.
 - 3. Sprinkler specialty pipe fittings.
 - 4. Sprinklers.
 - 5. Alarm devices.
 - 6. Manual control stations.
 - 7. Pressure gages.
- B. Related Requirements:
 - 1. Section 211119 "Fire Department Connections" for exposed-type fire department connections.
 - 2. Section 210523 "Fire Protection Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.

1.3 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For dry-pipe sprinkler systems.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For dry-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed

and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Compressed air piping.
 - 2. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- B. Qualification Data: For qualified Installer and professional engineer.
- C. Design Data:
 - 1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- D. Fire-hydrant flow test report.
- E. Field Test Reports:
 - 1. Fire-hydrant flow test report.
 - 2. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- F. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For dry-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

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. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

1.9 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 1. Notify Construction Manager no fewer than Seven days in advance of proposed interruption of sprinkler service.
 2. Do not proceed with interruption of sprinkler service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from opened sprinklers.

2.2 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 1. NFPA 13.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design dry-pipe sprinkler systems.
 1. Available fire-hydrant flow test records indicate the following conditions:
 - a. Date: 6/21/2023
 - b. Performed by: Veolia.
 - c. Location of Residual Fire Hydrant R: Hydrant 20-55
 - d. Location of Flow Fire Hydrant F: Hydrant 20-46
 - e. Static Pressure at Residual Fire Hydrant R: 80 psig
 - f. Measured Flow at Flow Fire Hydrant F: 960 gpm
 - g. Residual Pressure at Residual Fire Hydrant R: 960 psig

- D. Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 5 PSI, including losses through water-service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications:
 - a. Automobile Parking Areas: Ordinary Hazard, Group 1
 - b. Repair Garages: Ordinary Hazard, Group 2
 - 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1950-sq. ft.area.
 - 4. Maximum Protection Area per Sprinkler: According to UL listing.
 - 5. Maximum Protection Area per Sprinkler:
 - a. Mechanical Equipment Rooms: 130 sq. ft..
 - b. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
 - 6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - a. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

2.3 STEEL PIPE AND FITTINGS

- A. Malleable- or Ductile-Iron Unions: UL 860.
- B. Cast-Iron Flanges: ASME B16.1, Class 125.
- C. Plain-End-Pipe Fittings: UL 213, ductile-iron body with retainer lugs that require one-quarter turn or screwed retainer pin to secure pipe in fitting.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International.
 - b. Shurjoint Piping Products.
- D. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Smith-Cooper International.
 - f. Tyco Fire Products LP.
 - g. Victaulic Company.
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213

rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.4 SPECIALTY VALVES

- A. Listed in UL's "Fire Protection Equipment Directory".
- B. Pressure Rating:
 - 1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
- C. Body Material: Cast or ductile iron.
- D. Size: Same as connected piping.
- E. End Connections: Flanged or grooved.
- F. Dry-Pipe Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Globe Fire Sprinkler Corporation.
 - b. Reliable Automatic Sprinkler Co., Inc. (The).
 - c. Tyco Fire Products LP.
 - d. Venus Fire Protection Ltd.
 - e. Victaulic Company.
 - f. Viking Corporation.
 - 2. Standard: UL 260.
 - 3. Design: Differential-pressure type.
 - 4. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - 5. Air-Pressure Maintenance Device:
 - a. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Globe Fire Sprinkler Corporation.
 - 2) Reliable Automatic Sprinkler Co., Inc. (The).
 - 3) Tyco Fire Products LP.
 - 4) Venus Fire Protection Ltd.
 - 5) Victaulic Company.
 - 6) Viking Corporation.
 - 6. Standard: UL 260.
 - 7. Type: Automatic device to maintain minimum air pressure in piping.
 - 8. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and 175-psig outlet pressure.

9. Air Compressor:
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Gast Manufacturing Inc.
 - 2) General Air Products, Inc.
 - 3) Viking Corporation.
 - b. Standard: UL's "Fire Protection Equipment Directory."
 - c. Motor Horsepower: Fractional.
 - d. Power: 120-V ac, 60 Hz, single phase.
- G. Automatic (Ball Drip) Drain Valves:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reliable Automatic Sprinkler Co., Inc. (The).
 - b. Tyco Fire Products LP.
 2. Standard: UL 1726.
 3. Pressure Rating: 175-psig minimum.
 4. Type: Automatic draining, ball check.
 5. Size: NPS 3/4.
 6. End Connections: Threaded.

2.5 SPRINKLER PIPING SPECIALTIES

- A. General Requirements for Dry-Pipe System Fittings: UL listed for dry-pipe service.
- B. Branch Outlet Fittings:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International.
 - b. National Fittings, Inc.
 - c. Shurjoint Piping Products.
 - d. Tyco Fire Products LP.
 - e. Victaulic Company.
 2. Standard: UL 213.
 3. Pressure Rating: 175-psig minimum.
 4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 5. Type: Mechanical-tee and -cross fittings.
 6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 8. Branch Outlets: Grooved, plain-end pipe, or threaded.
- C. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing Inc.
 - b. Reliable Automatic Sprinkler Co., Inc. (The).
 - c. Tyco Fire Products LP.
 - d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory"
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

D. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Elkhart Brass Mfg. Co., Inc.
 - b. Fire-End & Croker Corporation.
 - c. Potter Roemer LLC.
2. Standard: UL 199.
3. Pressure Rating: 175-psig minimum.
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

E. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing Inc.
 - b. Triple R Specialty.
 - c. Tyco Fire Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
2. Standard: UL's "Fire Protection Equipment Directory."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

F. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aegis Technologies, Inc.
 - b. CECA, LLC.
 - c. Corcoran Piping System Co.
 - d. Merit Manufacturing.
 2. Standard: UL 1474.
 3. Pressure Rating: 250-psig minimum 300 psig.
 4. Body Material: Steel pipe with EPDM O-ring seals.
 5. Size: Same as connected piping.
 6. Length: Adjustable.
 7. Inlet and Outlet: Threaded.
- G. Flexible Sprinkler Hose Fittings:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fivalco Inc.
 - b. FlexHead Industries, Inc.
 - c. Gateway Tubing, Inc.
 - d. Victaulic Company.
 2. Standard: UL 1474.
 3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
 4. Pressure Rating: 175-psig minimum.
 5. Size: Same as connected piping, for sprinkler.

2.6 SPRINKLERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Globe Fire Sprinkler Corporation.
 2. Reliable Automatic Sprinkler Co., Inc. (The).
 3. Tyco Fire Products LP.
 4. Venus Fire Protection Ltd.
 5. Victaulic Company.
 6. Viking Corporation.
- B. Listed in UL's "Fire Protection Equipment Directory"
- C. Pressure Rating for Residential Sprinklers: 175-psig maximum.
- D. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- E. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199.
 2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- F. Sprinkler Finishes: bronze painted.
- G. Special Coatings: Wax lead corrosion-resistant paint.
- H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Chrome-plated steel, one piece, flat Plastic, white finish, one piece, flat.
 2. Sidewall Mounting: Chrome-plated steel Plastic, white finish, one piece, flat.
- I. Sprinkler Guards:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reliable Automatic Sprinkler Co., Inc. (The).
 - b. Tyco Fire Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
 2. Standard: UL 199.
 3. Type: Wire cage with fastening device for attaching to sprinkler.

2.7 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Motor-Operated Alarm:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Globe Fire Sprinkler Corporation.
 - b. Tyco Fire Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
 2. Standard: UL 753.
 3. Type: Mechanically operated, with Pelton wheel.
 4. Alarm Gong: Cast aluminum with red-enamel factory finish.
 5. Size: 10-inch diameter.
 6. Components: Shaft length, bearings, and sleeve to suit wall construction.
 7. Inlet: NPS 3/4.
 8. Outlet: NPS 1 drain connection.

C. Electrically Operated Alarm Bell:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell International company.
 - b. Notifier.
 - c. Potter Electric Signal Company, LLC.
2. Standard: UL 464.
3. Type: Exterior strobe red filter for water flow.
4. Size: 6-inch diameter.
5. Finish: Red-enamel factory finish, suitable for outdoor use.
6. 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.

D. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Barksdale, Inc.
 - b. Detroit Switch, Inc.
 - c. Potter Electric Signal Company, LLC.
 - d. System Sensor.
 - e. Tyco Fire Products LP.
 - f. United Electric Controls Co.
 - g. Viking Corporation.
2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

E. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell International company.
 - b. Kennedy Valve Company; a division of McWane, Inc.
 - c. Potter Electric Signal Company, LLC.
 - d. System Sensor.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

6. 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

2.8 PRESSURE GAGES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. AGF Manufacturing Inc.
 2. AMETEK, Inc.
 3. Ashcroft Inc.
 4. Brecco Corporation.
 5. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gauge Range: 0- to 250-psig minimum
- E. Label: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gauge: Include "AIR" or "AIR/WATER" label on dial face.

PART 3 – EXECUTION

2.8 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements in Section 211100 "Facility Fire-Suppression Water-Service Piping" for exterior piping.
- B. Install shutoff valve, pressure gage, drain, and other accessories indicated at connection to water-service piping.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

- A. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install automatic (ball drip) drain valves to drain piping between fire department connections and check valves. Drain to floor drain or to outside building.
- J. Connect air compressor to the following piping and wiring:
 - 1. Pressure gages and controls.
 - 2. Electrical power system.
 - 3. Fire-alarm devices, including low-pressure alarm.
- K. Install alarm devices in piping systems.

- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.
- M. Drain dry-pipe sprinkler piping.\
- N. Pressurize and check dry-pipe sprinkler system piping and air compressors.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.5 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.]\
- I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 1. Install valves in vertical position for proper direction of flow, in main supply to system.
 2. Install dry-pipe valves with trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Install air compressor and compressed-air-supply piping.
 - b. Install air-pressure maintenance device with shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.
 - c. Install compressed-air-supply piping from building's compressed-air piping system.

3.7 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- B. Install sprinklers with water supply from heated space. Do not install pendent or sidewall sprinklers in areas subject to freezing.

- C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.8 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL\

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Start and run air compressors.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.10 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.11 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.12 PIPING SCHEDULE

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded or grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, dry-pipe sprinkler system, NPS 2 and smaller, shall be one of the following:
 - 1. Standard-weight, steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints. Standard-weight or thin wall, steel pipe with plain ends; plain-end-pipe fittings; and twist-locked joints.
- D. Standard-pressure, dry-pipe sprinkler system, NPS 2-1/2 to NPS 4, shall be one of the following:
 - 1. Standard-weight, steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - 2. Standard-weight, steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- E. Standard-pressure, dry-pipe sprinkler system, NPS 5 and NPS 6, shall be one of the following:
 - 1. Standard-weight, steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - 2. Standard-weight, steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.13 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers
 - 2. Rooms with Suspended Ceilings: Dry pendent sprinklers
 - 3. Wall Mounting: Dry sidewall sprinklers.
 - 4. Spaces Subject to Freezing: Upright sprinklers
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 - 1. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION

SECTION 22 00 05

PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install potable water, sanitary drainage, storm drainage and gas piping systems complete and operational with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the plumbing Work.
2. Notify other contractors in advance of the installation of the plumbing Work to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the plumbing Work.

C. Related Sections:

1. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. ANSI A21.1, Practice Manual, Computation Strength, Thickness.
2. ANSI A21.4, Cement-Mortar Lining/Cast and Ductile Iron Pipe and Fittings.
3. ANSI A21.10, Cast-Iron and Ductile Iron Fittings, 2 thru 48 in. Water.
4. ANSI A21.11, Rubber Gasket Joints Cast and Ductile Iron Pressure Pipe.
5. ANSI A21.51, Ductile-Iron Pipe Centrifugal Cast, in Metal Molds.
6. ANSI A112.19.2M, Vitreous China Plumbing Fixtures.
7. ANSI A117.1, Accessible and Usable Buildings and Facilities.
8. ANSI B16.9, Factory-Made Wrought Buttwelding Fittings.
9. ANSI B16.12, Cast-Iron Threaded Drainage Fittings.
10. ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
11. ANSI B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings. (ASME B16.22).
12. ANSI B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150 and 300 lbs. (ASME B16.24).
13. ANSI B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
14. ANSI B16.33, Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 PSI (Sizes NPS 1/2 through NPS 2). (ASME B16.33).
15. ANSI B16.39, Malleable Iron Threaded Pipe Unions.
16. ANSI B16.42, Ductile Iron Pipe Flanges and Flanged Fittings.
17. ANSI B40.1, Gages-Pressure Indicating Dial Type-Elastic Element.

18. ANSI B125.2, Black and Hot-Dipped Zinc-Coated Welded and Seamless Pipe, (ASTM A 120).
19. ANSI H23.1, Seamless Copper Water Tube, (ASTM B 88).
20. American Society of Sanitary Engineering (ASSE), ASSE 1013, Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
21. ASTM A 53/A 53M, Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless Pipe.
22. ASTM A 74, Specification for Cast-Iron Soil Pipe and Fittings.
23. ASTM A 106/A 106M, Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
24. ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
25. ASTM A 888, Specification for Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
26. ASTM B 32, Specification for Solder Metal.
27. ASTM B 88, Specification for Seamless Copper Water Tube.
28. ASTM C 564, Specification for Rubber Gaskets for Cast-Iron Soil Pipe and Fittings.
29. ASTM D 1330, Specification for Rubber Sheet Gaskets.
30. AWWA C511, Reduced-Pressure Principle Backflow Prevention Assembly.
31. 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.
32. CISPI HSN, Specification for Neoprene Rubber Gaskets for Hub and Spigot Cast 300N Soil Pipe and Fittings.
33. FS O-F-506, Flux, Soldering: Paste and Liquid.
34. FS WW-H-171, Hangers and Supports, Pipe.
35. FS QQ-C-40, Calking Lead Wool and Lead Pig.
36. FS WW-P-541/1, Plumbing Fixtures (Water Closet).
37. FS WW-U-516, Unions, Brass or Bronze, Threaded Pipe Connections and Solder-Joint Tube Connections.
38. FS WW-U-531, Unions, Pipe, Steel or Malleable Iron; Threaded Connection.
39. Manufacturers Standardization Society (MSS), MSS SP 69, Pipe Hangers and Supports – Selection and Application.
40. NFPA 54, Nation Fuel Gas Code.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage installer regularly engaged in plumbing piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to Engineer.
2. Engage installers for the entire plumbing piping systems with undivided responsibility for performance and other requirements.

- B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
 - 1. National Electrical Code, (NEC).
 - 2. Local and State Building Codes and Ordinances.
- C. Component Supply and Compatibility:
 - 1. Obtain all equipment included in this Section regardless of the component manufacturer from a single plumbing manufacturer.
 - 2. The plumbing manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
 - 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the plumbing manufacturer.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
 - b. Details of installation, including piping supports.
 - c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.
 - 2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications and engineering data.
 - b. Flexible connections.
 - c. Additional technical data related to the specified material and equipment as requested by Engineer.
 - d. Gasket material.
- B. Informational Submittals: Submit the following:
 - 1. Qualifications Statements:
 - a. Installer's qualifications.
- C. Closeout Submittals: Submit the following:
 - 1. Record Documentation:
 - a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping Work, submit CADD drawings showing the actual in place installation of all piping and equipment installed under this Section, at a scale satisfactory to the Owner. The drawings shall reflect all of the piping Work on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints

and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
 - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.
- B. Storage and Protection:
 - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 - 2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.
- C. Acceptance at Site:
 - 1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions

1.6 GENERAL REQUIREMENTS

- A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.
- B. The Drawings show an indication of the arrangement of equipment, ducts, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, ducts, etc., found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.
- C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case, adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.
- D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, Contractor, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the Engineer.

- E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. Contractor shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work “by others”, to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 HOT AND COLD WATER PIPING

A. Copper Water Tube:

1. Tube:
 - a. Reference: ANSI H23.1, ASTM B 88.
 - b. Type: K or L.
 - c. Temper: Hard-drawn or soft-annealed.
2. Fittings:
 - a. Reference: ANSI B16.22.
 - b. Reference: ANSI B16.26.
 - c. Reference: ANSI B16.18.
3. Joints:
 - a. Sweat:
 - 1) Solder Metal: ASTM B 32, Type 95-5TA.
 - 2) Flux: FS O-F-506, Type 1.
 - b. Flanged:
 - 1) Flanges: ANSI B16.24, 150 lb. class.
 - 2) Gaskets: Red rubber, ASTM D 1330, Grade 1, 1/8-inch thick.
 - 3) Nuts and Bolts: ASTM A 307.
4. Unions:
 - a. Reference: FS WW-U-516.
 - b. Material: Bronze.
 - c. Rating: 250-pound W.O.G.

B. Ductile Iron Pipe:

1. Pipe: Ductile Iron, ANSI A21.51.
2. Fittings: Ductile Iron, ANSI A21.1.
3. Joints:
 - a. Mechanical Joints:
 - 1) Glands, Bolts and Nuts: ANSI A21.11.
 - b. Flanged Joints:
 - 1) Reference: ANSI A21.10.
4. Lining: Mortar lined, ANSI A21.4.

C. Dielectric Couplings:

1. Manufacturers: Provide products of one of the following:
 - a. Watts Regulator Company.
 - b. Epco Sales, Incorporated.
 - c. Or equal.
2. Type: Union or flange.
3. Ratings:
 - a. Unions: 250 psi, ANSI B16.39.
 - b. Flanges: 175 psi, ANSI B16.42 (Iron), ANSI B16.24 (Bronze).

2.2 STORM AND SANITARY PIPING

- A. Cast-Iron Soil Pipe and Fittings:
 1. Pipe and Fittings: ASTM A 74.
 2. Weight: Service-Weight.
 3. Joints:
 - a. Compression:
 - 1) Gasket: Neoprene Rubber, ASTM C 564, CISPI HSN.
 - 2) Lubricant: As recommended by pipe manufacturer.
 - b. Calked:
 - 1) Lead: FS QQ-C-40, Type I, Grade AA.
 - 2) Jute Packing: FS HH-P-117, Type I.
- B. Steel Pipe and Fittings:
 1. Pipe: ANSI B125.2.
 2. Weight: Schedule 40.
 3. Finish: Galvanized.
 4. Fittings: ANSI B16.12 recessed drainage pattern galvanized cast-iron, threaded to allow 1/8-inch or 1/4-inch per foot grade, as required.
- C. Hubless Cast-Iron:
 1. No-Hub Pipe and Fittings: ASTM A 888.
 2. Joints: CISPI 310.

2.3 NATURAL GAS PIPING

- A. Steel Pipe:
 1. Pipe:
 - a. Reference: Pipe sizes 2-inches to 24-inches, ASTM A 53/A 53M, Type S, Schedule 40, Grade B.
 - b. Reference: Pipe sizes less than 2-inches, ASTM A 106/A 106M, Schedule 40.
 - c. Weight: Schedule 40.
 - d. Finish: Black.
 - e. Piping 2-inches and larger shall conform to ASTM A 53/A 53M.
 - f. Piping 1-1/2-inches and smaller shall conform to ASTM A 106/A 106M.
 - g. End Connections:
 - 1) Schedule 40: Up to 1-1/2-inch size, may be threaded.

- 2) Schedule 40: Two-inch and larger shall be welded; weld end (API 1104, ASME Section IX Boiler and Pressure Vessel Code. Connections to regulators, valves, meters with flanged ends shall be flanged).
 2. Fittings:
 - a. Threaded:
 - 1) Reference: ANSI B16.33, 150 lb.
 - 2) Material: Malleable iron.
 - 3) Finish: Black.
 - b. Welded:
 - 1) Reference ANSI B16.9.
 - 2) Material: Wrought steel.
 - 3) Finish: Black.
 3. Unions:
 - a. Threaded: Malleable iron, FS WW-U-531, Class 1, Type B.
 4. Joint Compound:
 - a. Materials: Resistant to the action of liquefied petroleum gas or natural gas.
 5. Insulating couplings, Dresser type, a steel body with gaskets and retainer cups.
- B. Buried Piping: Refer to local gas utility company requirements.
- C. Dielectric Couplings:
1. Manufacturers: Provide products of one of the following:
 - a. Watts Regulator Company.
 - b. Epco Sales, Incorporated.
 - c. Or equal.
 2. Type: Union or flange.
 3. Ratings:
 - a. Unions: 250 psi, ANSI B16.39.
 - b. Flanges: 175 psi, ANSI B16.42 (Iron), ANSI B16.24 (Bronze).

2.4 VALVES AND ACCESSORIES

- A. Bronze Body Globe Valves:
1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. No. B-24.
 - b. Lunkenheimer Company, Fig. No. 126.
 - c. Or equal.
 2. Type: Composition disc, union bonnet.
 3. Materials: Brass and bronze.
 4. Rating: 150 lb. SWP.
 5. End Connections: Solder joint.
- B. Bronze Body Check Valves:
1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. No. B-309.
 - b. Lunkenheimer Company, Fig. No. 2145.

- c. Or equal.
 2. Type: Swing, regrinding bronze disc, screw-in cap.
 3. Materials: Brass and bronze.
 4. Rating: 150 lb. SWP.
 5. End Connections: Solder joint.
- C. Bronze Body Ball Valves:
1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. S-217 BR-R-T.
 - b. Lunkenheimer Company, Fig. 707-XLT.
 - c. Or equal.
 2. Type: Non-blowout stem, adjustable packing gland, quarter turn, full port ball valve.
 3. Materials:
 - a. Body: Cast bronze.
 - b. Ball: Chrome plated brass.
 - c. Packing and Seats: Teflon.
 4. Rating: 150 lb. SWP.
 5. End Connection: Screwed. Provide screwed to sweat adapters, where required.
- D. Lubricated Plug Valves:
1. Manufacturers: Provide products of one of the following:
 - a. Walworth Company.
 - b. Nordstrom Valves, Inc.
 - c. Or equal.
 2. Type: Short pattern, wrench operated.
 3. Pressure Rating: 175 lb. W.O.G- 350 lb. test.
 4. End Connections: Threaded (up to 2-1/2-inch); flanged (3-inch and larger).
 5. Construction: Cast-iron body and plug with steel trim.
 6. Sealant: Suitable for gas application.
 7. Wrench: To suit valve.
- E. Lubricated Stop Cocks (Up to 2-inches):
1. Manufacturers: Provide products of one of the following:
 - a. Eclipse Fuel Engineering Company.
 - b. A. Y. McDonald Manufacturing Company.
 - c. Or equal.
 2. Type: Flat head.
 3. Pressure Rating: 125 lb. W.O.G.
 4. End Connections: Threaded.
 5. Construction: Iron body, bronze plug.
- F. Natural Gas Pressure Regulator: In accordance with the requirements of the local utility company.
- G. Natural Gas Meter:
1. Manufacturer: In accordance with requirements of the local utility company.

2.5 EQUIPMENT

A. Hose Bibbs, Pipe Drains:

1. Products and Manufacturers: Provide one of the following:
 - a. Woodford Manufacturing Company, Model 24C.
 - b. Nibco, Incorporated, Fig. No. 74VB.
 - c. Or equal.
2. Valve:
 - a. Type: Indoor/non-freeze area boiler drain globe valve, chrome plated.
 - b. Materials: Bronze body, screwed bonnet, renewable composition disc.
 - c. End Connections: Hose thread outlet, male pipe thread or sweat inlet.
 - d. Rating: 125 lbs. W.O.G.
3. Vacuum Breaker:
 - a. Type: Non-removable, atmospheric.
 - b. Materials: Brass body, stainless steel trim, silicone rubber diaphragm and disc.
 - c. End Connections: Hose thread inlet and outlet.

B. Thermometers:

1. Manufacturers: Provide products of one of the following:
 - a. Weksler Instrument Company.
 - b. H.O. Trerice Company.
 - c. Or equal.
2. Range: 30°F to 240°F temperature range in maximum of 2°F increments.
3. Type: Adjustable angle column type thermometer.
 - a. Construction:
 - 1) Scales and Lens: Nine-inch high satin finish aluminum scales, black numerals, front red reading mercury tubes.
 - 2) Wells: Insertion well with brass separable sockets.
 - 3) Neck: 2-1/2-inch extension neck.
 - 4) Case: Cast aluminum with bronze finish.
 - 5) Window: Glass or clear acrylic plastic.

C. Pressure Gages:

1. Manufacturers: Provide products of one of the following:
 - a. Weksler Instrument Company.
 - b. H.O. Trerice Company.
 - c. Or equal.
2. Reference: ANSI B40.1 for Grade AA gages.
3. Type: Direct mounted, dial type pressure gage.
4. Construction:
 - a. Case: Six-inch diameter cast aluminum, flangeless with black finish and bottom 1/4-inch N.P.T.
 - b. Ring: Chrome plated close type.
 - c. Dial: White face, black numbers and graduations.
 - d. Window: Glass or clear acrylic plastic.
 - e. Pointer: Micrometer type, black finish, red tip.

- f. Movement: Stainless steel, rotary type, delrin sector and bushings.
- g. Bourdon Tube: Seamless phosphor bronze, Grade A over pressured and stress relieved.
- h. Socket and Tip: Forged brass, alloy steel and Type 316 stainless steel.
- 5. Accuracy: One percent, minimum.
- 6. Gage Cocks: Provide brass tee handle cock before each gage.

D. Backflow Preventers: RPZ-BFP:

- 1. Products and Manufacturers: Provide one of the following:
 - a. Febco, Model 825.
 - b. Watts Regulator Company, Series 909.
 - c. Or equal.
- 2. Type: Reduced pressure zone device with two independently acting check valves, together with an automatically operated pressure differential relief valve located between the two check valves.
- 3. Materials:
 - a. Body: Bronze.
 - b. Valve Discs: Buna-N rubber.
 - c. Diaphragm: Silicone rubber or Buna-N rubber.
 - d. Springs: Stainless steel.
 - e. Screws: Stainless steel.
- 4. Maximum Working Pressure: 150 psi.
- 5. End Connections: Screwed.
- 6. Accessories:
 - a. Air gap drain funnel with threaded outlet and vent elbow furnished by manufacturer minimum two pipe sizes larger than relief drain outlet.
 - b. Strainer with blowoff on inlet.
 - c. Ball valves on inlet and outlet.
 - d. Reduced pressure principle backflow preventer test kit for each unit furnished, provided in molded plastic carrying case with foam inserts.
- 7. References: ASSE 1013, AWWA C511.

E. Floor Drains:

- 1. Floor Drain and Shower Drain: (FD-1).
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Jay R. Smith, Fig. 2010-BP.
 - 2) Zurn Industries Fig. Z-415 with Y-strainer.
 - 3) Or equal.
 - b. Materials:
 - 1) Body: Enameled cast-iron.
 - 2) Collar: Cast-iron, reversible, threaded for strainer heads, enamel coated.
 - 3) Strainer Head: Square 8-inch by 8-inch nickel bronze grate with bronze body, heel proof grate, and vandal proof screws.
 - c. Outlet Connection: Bottom outlet, calk or no-hub, as required.
- 2. Bar Grate:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Tyler Pipe, Series 547.

- 2) Or equal.
- b. Type: Grate to be used in soil pipe hub openings.
- c. Body: Cast-iron with legs and grating on exposed face.

F. Roof Drains:

- 1. Roof Drain: (RD-1):
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Jay R. Smith, Fig. 1010-R-C-G.
 - 2) Zurn Industries Fig. Z-100-R-C.
 - 3) Or equal.
 - b. Materials:
 - 1) Body: Enameled cast-iron.
 - 2) Dome Top: Galvanized cast-iron.
 - c. Accessories:
 - 1) Sump receiver.
 - 2) Underdeck clamp.
 - d. Outlet Connections: Threaded, calk or no-hub, as required.

G. Cleanouts:

- 1. Cleanout Deck Plates (Finished Areas) FCO-1:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Jay R. Smith, Fig. 4040.
 - 2) Zurn Industries, Fig. No. Z-1400-3.
 - 3) Or equal.
 - b. Materials: Cast-iron body and adjustable nickel bronze top.
 - c. Outlet Connection: Standard spigot.
 - d. Accessories:
 - 1) Square nickel bronze top.
 - 2) Cast bronze taper thread plug.
- 2. Wall Cleanout Plate:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Jay R. Smith, Fig. 4402.
 - 2) Zurn Industries, Fig. No. Z-1440-1.
 - 3) Or equal.
 - b. Materials: Cast bronze taper thread plug.
 - c. Accessories:
 - 1) Stainless steel round shallow wall plate.
 - 2) Cast-iron calked ferrule.

H. Wall Hydrants:

- 1. Exposed Hose Connection, Non-Freeze Type:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Jay R. Smith, Fig. No. 5609-SE.
 - 2) Zurn Industries, Fig. No. Z-1310.
 - 3) Or equal.
 - b. Type: Anti-siphon non-freeze wall hydrant.
 - c. Materials:
 - 1) Casing: Bronze.

- 2) Vacuum Breaker: Integral.
- 3) Threads: Standard 3/4-inch hose thread outlet.
- 4) Wall Clamp: Adjustable with set screw.
- 5) Key: Removable tee handle type.
- d. Connection: 3/4-inch sweat end inlet and 3/4-inch hose thread outlet, universal type.

I. Oil Interceptor:

- 1. Products and Manufacturers: Provide one of the following:
 - a. Jay R. Smith, Fig. No. 8500 Series.
 - b. Zurn Industries, Fig. No. Z-1186.
 - c. Or equal.
- 2. Type: Heavy-duty floor recessed with H-20 load cover plate.
- 3. Materials:
 - a. Body: Acid resistant coated fabricated steel finish interior and exterior.
 - b. Trap: Double wall with cleanout.
 - c. Removable combination pressure equalizing, flow diffusing baffle and sediment bucket.
 - d. Horizontal baffle.
 - e. Specific gravity oil draw-off valve assembly connections either side.
 - f. Secured gasketed non-skid secured cover complete with flow control fitting.
 - g. Threaded inlet and outlet.
- 4. Capacity: Thirty-gallon water capacity.

J. Hangers and Supports:

- 1. Manufacturers: Provide products of one of the following:
 - a. ITT Grinnell Corporation.
 - b. B-LINE.
 - c. Or equal.
- 2. Type: Clamps, hooks, rods, hangers used to support plumbing piping systems from the structure.
- 3. Materials: Comply with the requirements of MSS SP 69, FS WW-H-171 latest edition, Underwriters' Laboratory listed and Factory Mutual approved.

K. Hot Water Temperature Maintenance Heat Tracing System:

- 1. Manufacturers: Provide products of one of the following:
 - a. Thermon Manufacturing Company.
 - b. Tyco Thermal Controls.
 - c. Or equal.
- 2. General: Furnish and install a complete UL listed system of heat trace cable(s) and components approved and designed specifically for maintaining various hot water temperatures ranging from 110°F to 140°F. Hot water from hot water heater(s) to plumbing fixtures and as shown shall be electrically traced with self-limiting heaters. Manufacturer shall assist in selecting the correct tracer and develop Bill of Materials. All connections and equipment shall be moisture-proof.

3. The heater cable assembly shall consist of two No. 14 AWG parallel nickel-plated copper bus wires imbedded in a self-regulating core and covered in a cross-linked polyolefin insulating jacket. The heater assembly shall be covered with tinned copper metallic braid and an outer jacket of cross-linked polyolefin insulation, nominally of 40-mil thickness, and color-coded for easy identification.
4. The cable shall be rated for 120 or 208-volt operation.
5. Pipe and heat trace shall be insulated with 1-1/2-inch thick fiberglass insulation as described herein this Section.
6. Provide all splice power-to-tracing connectors, thermostats, end terminations, straps, ground fault circuit breakers, junction boxes, etc., as required.

2.7 INSULATION

A. Fiberglass Insulation:

1. Products and Manufacturers: Provide one of the following:
 - a. Owens-Corning Fiberglass Corporation, Fiberglass 25ASJ/SSL.
 - b. Certain Teed Products Corporation, Certain Teed Snap-On ASJ-SSL.
 - c. Or equal.
2. Type: Heavy-density sectional pipe insulation with vapor barrier with self-sealing lap.
3. Fire Hazard Classification:
 - a. Flame Spread: 25.
 - b. Fuel Contributed: 50.
 - c. Smoke Developed: 50.
4. Density: Three lbs. per cubic foot, minimum.
5. Fittings: Molded fiberglass.
6. Jointing Materials: Manufacturers recommended adhesives and tape.
7. Valve Insulation: Miter cut nesting size covering segments of same thickness as pipeline, for insulation of valves.

B. Calcium Silicate Insulation at Insulation Protection Shields:

1. Products and Manufacturers: Provide one of the following:
 - a. Owens-Corning Fiberglass Corporation, Kaylo 10.
 - b. Johns-Manville, Thermo 12.
 - c. Or equal.
2. Type: Calcium silicate pipe insulation.
3. Fire Hazard Classification:
 - a. Flame Spread: 0.
 - b. Smoke Developed: 0.
4. Density: Fourteen lbs. per cubic foot.
5. Compressive Strength: 140 psi.
6. Cut insulation 1/2-inch longer than insulation shield it rests on.

C. Handicapped Lavatory Trim Insulation:

1. Products and Manufacturers: Provide one of the following:
 - a. Truebro, Inc., Model No. 102W with Accessory No. 105W.

- b. Brocar Products, Inc., Kit 500R with Accessory 500 HS or 500 HSK, as required.
 - c. McGuire Manufacturing Company, Incorporated, Pro Wrap.
 - d. Or equal.
- 2. Type: Flexible vinyl insulation for waste, traps, hot and cold water supplies.
- 3. References:
 - a. ADA Article 4.19.4.
 - b. ANSI A117.1.

2.8 PAINTING

- A. Piping, equipment and accessories shall be painted in accordance with Section 09 91 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install all items as shown, specified, and as recommended by the manufacturer.
 - 2. Request instructions from Engineer, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.
 - 3. Present conflicts to Engineer, in writing, who will determine corrective measures to be taken.
 - 4. Do not modify structures to facilitate installation of piping, unless specifically approved by Engineer.
 - 5. Installation to conform to the requirements of all local and state codes.
 - 6. Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Fill all systems and fully test all equipment, valves, etc. in operation.
 - 2. Check for excessive vibration while all systems are operating.
 - 3. Installed systems and components will not be released to Owner unless all systems have been tested and approved by the Engineer.
- B. Inspection:
 - 1. Examine areas to receive equipment, piping, valves and accessories for:
 - a. Defects that adversely affect execution and quality of the Work.
 - b. Deviations beyond allowable tolerances for equipment, piping, valves and accessories.
 - c. Start the Work only when conditions are satisfactory.

2. The Engineer reserves the right to reject or authorize replacement of equipment, piping, valves and accessories found to be defective, blistered, cracked or deviated from allowable tolerances as described above.

3.3 ADJUSTING AND CLEANING

- A. Adjusting:
 1. Adjust all controls for proper settings.
 2. While system is operable, balance all equipment, valves, dampers, etc. to achieve design conditions.
- B. Cleaning:
 1. Thoroughly clean all piping, fittings, valves, equipment and accessories prior to installation.
 2. Remove all dirt, rust, dust, etc. from piping and equipment in preparation for painting.
 3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

- A. Piping:
 1. All potable water supply, hot and cold 2-1/2-inches and smaller, run within the interior of a building, shall be hard-drawn copper Type "L" with solder joints and connections.
 2. All potable water piping 2-1/2-inches and smaller run underground shall be soft-annealed copper Type "K" copper tubing.
 3. All underground water piping 3-inches and larger shall be cement-lined ductile iron pipe with mechanical joints.
 4. All exposed gravity sanitary waste and vent and storm drainage piping run within the interior of a building shall be no-hub cast-iron.
 5. All gravity sanitary waste and vent and storm drainage piping located in concrete slabs or underground to exterior limits as shown shall be cast-iron soil pipe.
 6. All exposed water piping and valves to plumbing fixtures shall be chrome-plated brass.
 7. All exposed gas piping within the interior of a building or run within a chase or shaft shall be Schedule 40 black steel. All gas piping at a pressure of one psig or higher within the building shall be welded. All gas piping 1-inch diameter and larger shall be welded.
 8. All valves for copper or brass piping shall be bronze bodied, unless otherwise specified.
 9. All valves for ductile iron piping shall be iron bodied, unless otherwise specified.
 10. Use "wrought copper" fittings for copper tubing.
 11. Use "butt welded" fittings for welded steel pipe connections.

+ + END OF SECTION + +

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install hangers and supports complete with accessories for plumbing piping and equipment.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the hangers and supports for plumbing piping and equipment Work.
2. Notify other contractors in advance of the installation of the plumbing pipe and equipment hangers and supports to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the plumbing piping and equipment hangers and supports Work.

C. Related Sections:

1. Section 05 50 05, Anchor Systems.
2. Section 05 50 13, Miscellaneous Metal Fabrications.
3. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).
 - a. ANSI B1.1, Unified Inch Screw Threads. (ASME B1.1).
2. American Society for Testing and Materials, (ASTM).
 - a. ASTM A 36/A 36M, Specification for Carbon Structural Steel.
 - b. ASTM A 47/A 47M, Specification for Ferritic Malleable Iron Castings.
 - c. ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - d. ASTM A 575, Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - e. ASTM A 668/A 668M, Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
3. Federal Specifications, (FS).
 - a. FS WW-H-171, Hangers and Supports, Pipe.
4. Manufacturer's Standardization Society, (MSS).

- a. MSS SP 58, Pipe Hangers and Supports - Materials, Design and Manufacture.
- b. MSS SP 69, Pipe Hangers and Supports - Selection and Application.
- c. MSS SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- d. MSS SP 90, Guidelines on Terminology for Pipe Hangers and Supports.

1.3 QUALITY ASSURANCE

- A. Installer's Qualifications:
 1. Engage a single installer regularly engaged in hangers and supports installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to Engineer.
 2. Engage a single installer for the entire plumbing pipe and equipment hangers and supports system with undivided responsibility for performance and other requirements.
- B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
 1. American National Standards Institute, (ANSI).
 2. American Society of Mechanical Engineers, (ASME).
 3. National Fire Protection Association, (NFPA).
 4. Underwriters' Laboratories, Incorporated, (UL).
 5. Local and State Building Codes and Ordinances.
 6. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.
- C. Component Supply and Compatibility:
 1. Obtain all products included in this Section regardless of the component manufacturer from a single plumbing pipe and equipment hangers and supports manufacturer.
 2. The plumbing piping and equipment hangers and supports manufacturer shall review and approve all Shop Drawings and other submittals for all components furnished under this Section.
 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the plumbing piping and equipment hangers and supports manufacturer.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Shop Drawings:
 - a. Details of installation.

- b. Detailed drawings showing all hangers and supports for each piping system. Drawings shall show location, installation, material, loads, forces, stresses and deflections of all hangers and supports.
 - 2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications and engineering data.
 - b. Other technical data related to the specified material and equipment as requested by Engineer.
- B. Informational Submittals: Submit the following:
 - 1. Qualifications Statements:
 - a. Installer's Qualifications.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
 - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.
- B. Storage and Protection:
 - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 - 2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.
- C. Acceptance at Site:
 - 1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

- A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.
- B. The Drawings show an indication of the arrangement of equipment, piping, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, etc. found to interfere with

the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.

- C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case, adequately provide for expansion and circulation and minimize the amount of space required for the same.
- D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, Contractor, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the Engineer.
- E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. Contractor shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Components of hangers and supports shall conform to the following:
 - 1. Materials:
 - a. Bolts: ASTM A 307, Grade A, unless otherwise specified below.
 - b. Forgings: ASTM A 668/A 668M.
 - c. Malleable Iron: ASTM A 47/A 47M.
 - d. Rods and Bars: ASTM A 575.
 - e. Threads: Unified Screw Threads, Class 2A and 2B, ANSI B1.1.
 - f. Structural Steel: ASTM A 36/A 36M.
 - 2. Finish:
 - a. Steel or Malleable Iron Items: Galvanized, unless otherwise specified or as shown.
 - b. Steel or Malleable Iron Materials Used for the Support of Uninsulated Copper Piping: Copper plated.
 - c. Framing Members and Fittings: Dip painted with corrosion resistive primer as specified in Section 09 91 00, Painting.
 - d. All hangers, rods, bolts, nuts, inserts, washers located in the corrosive areas shall be Type 316 stainless steel.
- B. Pipe Attachments: The following types of pipe attachments shall be considered acceptable:
 - 1. Adjustable Steel Clevis: FS WW-H-171E, Type 1.

2. Steel Double Bolt Pipe Clamp: FS WW-H-171E, Type 3.
 3. Steel Pipe Clamp: FS WW-H-171E, Type 4.
 4. Adjustable Swivel Pipe Ring: FS WW-H-171E, Type 6.
 5. Adjustable Steel Band Hanger: FS WW-H-171E, Type 7.
 6. Riser Clamp: FS WW-H-171E, Type 8.
 7. Light-Duty Cleves Hanger: FS WW-H-171E, Type 12.
 8. Long Clips: FS WW-H-171E, Type 26.
 9. Offset J-Hooks: FS WW-H-171E, Type 27.
 10. Steel Pipe Covering Protection Saddle: FS WW-H-171E, Type 40A.
 11. Insulation Protection Shield: FS WW-H-171E, Type 41.
 12. Pipe Saddle Support: FS WW-H-171E, Type 37.
 13. Pipe Stanchion Saddle: FS WW-H-171E, Type 38.
 14. Pipe Saddle Support with Base: FS WW-H-171E, Type 36.
 15. Adjustable Roller Hanger: FS WW-H-171E, Type 42.
- C. Structural Attachments: The following types of structural attachments shall be considered acceptable:
1. Side Beam Clamp: FS WW-H-171E, Type 20.
 2. Center I-Beam Clamp: FS WW-H-171E, Type 21.
 3. Welded Steel Bracket: FS WW-H-171E, Types 32 and 33.
 4. Side Beam Bracket: FS WW-H-171E, Type 35.
 5. Malleable Iron with Galvanized Finish Concrete Insert: FS WW-H-171E, Type 18. The use of steel concrete inserts is prohibited and NOT acceptable.
- D. Hanger Rod Attachments: Use as required to complete assembly:
1. Forged Steel Clevis: FS WW-H-171E, Type 14.
 2. Adjustable Turnbuckle: FS WW-H-171E, Type 15.
 3. Forged Steel Welders Eye Nut: FS WW-H-171E, Type 17.
- E. Expansion Joints:
1. Manufacturers: Provide products of one of the following:
 - a. Flexonics Division, Universal Oil Products Company.
 - b. Anaconda Metal Hose Division, Anaconda American Brass Company.
 - c. Or equal.
 2. 2-1/2-inch and Smaller Copper Tubing:
 - a. Construction: Two-ply phosphor bronze seamless bellows.
 - b. Shrouds: Brass protective shrouds.
 - c. End Connections: Male and female solder end fittings or screwed ends with adaptors for screwed to sweat ends.
 3. 3-inch and Larger:
 - a. Construction: Free flexing expansion joints with stainless steel corrugated members.
 - b. End Connections: Welded ends with flanges.
- F. Alignment Guides:
1. Type: Semi-steel spider with four guiding fingers and guiding cylinder with base.

2. Manufacturers: Provide products of one of the following:
 - a. Flexonics Division, Universal Oil Products Company.
 - b. Anaconda Metal Hose Division, Anaconda American Brass Company.
 - c. Or equal.
- G. Connection Bolts: Materials shall be as specified in other Sections of these Specifications or as shown. Where materials are not specified or shown, they shall be of Type 304 stainless steel with Monel nuts.
- H. Toggle Bolts:
 1. Provide zinc plated spring wing toggle bolts of the size required for secure anchorage of individual items, but not less than 1/4-inch diameter, of length required.
 2. Products and Manufacturers: Provide one of the following:
 - a. Spring Wing Toggle Bolts by Ramset Fastening Systems.
 - b. Rawl Toggle Bolts, Spring Wing Type.
 - c. Or equal.
- I. Contractor shall furnish and install all necessary supports, angle iron stands, miscellaneous steel, inserts, anchor bolts and hangers required for all equipment furnished under this Contract, unless otherwise noted. All supports shall meet the requirements of the applicable Sections of Division 05, Metals.

2.2 PAINTING

- A. All pipe hangers, supports and restraints shall be painted as required in accordance with the requirements of Section 09 91 00, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 1. Install all items as shown, specified, and as recommended by the manufacturer.
 2. Request instructions from Engineer, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.
 3. Present conflicts to Engineer, in writing, who will determine corrective measures to be taken.
 4. Do not modify structures to facilitate installation of pipe hangers, supports and restraints, unless specifically approved by Engineer.
 5. Installation to conform to requirements of all local and state codes.
 6. Protection: Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. Examine areas to receive plumbing piping and equipment hangers and supports and accessories for:
 - a. Defects that adversely affect execution and quality of the Work.
 - b. Deviations beyond allowable tolerances for pipe hangers, supports and restraints and accessories.
 - c. Start the Work only when conditions are satisfactory.
 - 2. The Engineer reserves the right to reject or authorize replacement of pipe hangers, supports and restraints and accessories found to defective.

3.3 ADJUSTING AND CLEANING

- A. Adjusting:
 - 1. Adjust all materials for proper settings.
- B. Cleaning:
 - 1. Thoroughly clean all pipe hangers, supports and restraints and accessories prior to installation.
 - 2. Remove all dirt, rust, dust, etc. from all pipe hangers, supports and restraints in preparation for required painting.
 - 3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

- A. Hangers, Supports and Restraints for Horizontal Piping:
 - 1. Space supports and hangers for all piping no farther apart than shown below, unless otherwise shown:
 - a. Copper Tube:
 - 1) All Pipes: 6 feet-0 inch on center.
 - b. Steel Pipe:
 - 1) Pipes up to 1-inch: 6 feet-0 inch on center.
 - 2) Pipes 1-1/4-inch to 6-inch: 8 feet-0 inch on center.
 - c. Cast-Iron Pipe:
 - 1) Two supports per length.
 - d. Plastic Pipe:
 - 1) 3 feet-0 inch on center for all sizes, unless otherwise recommended by manufacturer for 100°F ambient temperature.
- B. Hanger Rods: Size hanger rods according to the schedule below, unless noted otherwise.

<u>Nominal Pipe (Inches)</u>	<u>Rod Diameter (Inches)</u>
1/2 through 2	3/8
2-1/2 through 3-1/2	1/2
4 through 5	5/8

- C. Supports for Vertical Piping:
1. Provide riser clamp placed under hub, fitting or coupling with approved solid bearing on steel sleeve at each floor level.
 2. Where riser clamps are used with plastic piping they shall be modified so as not to exert any compressive forces on the pipe.
 3. Support spacing shall not exceed code requirements.
 4. Piping support intervals shall not exceed those listed in Paragraph 3.4.A., above.
 5. Additional supports shall be placed immediately adjacent to any change in piping direction, and on both sides of valves and couplings.
 6. Accurately locate inserts for hanger rods in forms before concrete is placed.
 7. Use Type 304 stainless steel expansion anchor assemblies of the capsule polyester resin adhesive type and only to support rods, hangers and brackets for piping 1-inch and smaller no other type will be considered and only if the expansion anchors are designed to carry 100 percent of the full load, hanger, and/or bracket and pipe load.
- D. Supports for water meters and backflow preventers: Provide pipe saddle supports with base anchored to floor.
- E. Structural members shall conform to Section 05 12 00, Structural Steel Framing.
- F. Anchor bolts, expansion anchors and concrete inserts shall conform to Section 05 05 33, Anchor Systems.
- G. Miscellaneous metal fabrications shall conform to Section 05 50 13, Miscellaneous Metal Fabrications.
- H. Allow clearances for expansion and contraction of piping.
- I. Anchors shall be designed to prevent any pipe movement at pipe anchorage points. Anchors shall be securely fastened to the construction directly or indirectly through structural framing:
1. Piping 2-1/2-inches and Smaller: Anchor horizontal runs over 50 feet to midpoint to allow expansion toward expansion compensators (anchor intervals shall not exceed 30 feet) or elbows.
 2. Piping 3-inches and Larger: Anchor horizontal runs over 100 feet at mid-points to force expansion toward expansion compensators.
 3. Provide alignment guides in accordance with expansion compensator manufacturer recommendations.
- J. Provide expansion compensators where necessary to absorb expansion and contraction in heating lines and as follows:
1. Thirty feet on center of copper piping.
 2. Fifty feet on center of steel piping.

- K. Locate first set of alignment guides within four pipe diameters of the anchor or expansion compensator, the second set of pipe alignment guides shall be located within fourteen pipe diameters of the first guides.

+ + END OF SECTION + +

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install domestic water piping systems complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the domestic water piping systems Work.
2. Notify other contractors in advance of the installation of the domestic water piping systems to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the domestic water piping systems Work.

C. Related Sections:

1. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. ANSI A13.1, Scheme for Identification of Piping Systems.
2. ANSI A21.1, Practice Manual, Computation Strength, Thickness.
3. ANSI A21.4, Cement-Mortar Lining/Cast and Ductile Iron Pipe and Fittings (AWWA C105).
4. ANSI A21.10, Cast-Iron and Ductile Iron Fittings, 2-inches through 48-inches, for Water (AWWA C110).
5. ANSI A21.11, Rubber Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings (AWWA C111).
6. ANSI A21.51, Ductile-Iron Pipe Centrifugally Cast, in Metal Molds (AWWA C151).
7. ANSI A112.1.2, Air Gaps in Plumbing System.
8. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 150 and 800.
9. ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
10. ANSI B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings (ASME B16.22).
11. ANSI B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, 150 and 300 lbs (ASME B16.24).

12. ANSI B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
13. ANSI B16.39, Malleable Iron Threaded Pipe Unions.
14. ANSI B16.42, Ductile Iron Pipe Flanges and Flanged Fittings.
15. ANSI B40.1, Gages - Pressure Indicating Dial - Elastic Element.
16. ANSI H 23.1, Seamless Copper Water Tube, (ASTM B 88).
17. ANSI Z358.1, Emergency Eyewash and Shower Equipment.
18. American Society of Sanitary Engineers (ASSE), ASSE 1001, Performance Requirements for Atmospheric Type Vacuum Breakers.
19. ASSE 1013, Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
20. ASSE 1018, Trap Seal Primer Valves – Water Supply Fed.
21. ASSE 1020, Performance Requirements for Pressure Vacuum Breaker Assembly.
22. ASTM A 126, Specification for Gray Iron Casting for Valves, Flanges and Pipe Fittings.
23. ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
24. ASTM B 32, Specification for Solder Metal.
25. ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.
26. ASTM B 88, Specification for Seamless Copper Water Tube.
27. ASTM D 1330, Specification for Rubber-Sheet Gaskets.
28. AWWA C511, Reduced-Pressure Principle Backflow Prevention Assembly.
29. FS O-F-506, Flux, Soldering: Paste and Liquid.
30. FS WW-U-516, Unions, Brass or Bronze, Threaded Pipe Connections and Solder-Joint Tube Connections.
31. Plumbing and Drainage Institute (PDI), PDI WH 201, Water Hammer Arresters.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in domestic water piping installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to Engineer.
2. Engage a single installer for the entire domestic water piping system with undivided responsibility for performance and other requirements.

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. National Electrical Code, (NEC).
2. Local and State Building Codes and Ordinances.

C. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single domestic water piping systems manufacturer.
2. The domestic water piping systems manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the domestic water piping systems manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. 1/4-inch scale piping layouts, dimensioned to show length of piping runs, pipe sizes, support spacing and expansion provisions.
 - b. Details of installation, including piping supports.
 - c. Submit pipe schedule with laminate construction, sizes, thickness, vacuum pressure, weight per foot pressure, spans, joint type and flange data.
2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications and engineering data.
 - b. Flexible connections.
 - c. Other technical data related to the specified material and equipment as requested by Engineer.
 - d. Gasket material.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
 - a. Installer's qualifications.

C. Project Closeout Submittals: Submit the following:

1. Record Documentation:
 - a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of piping Work, submit CADD drawings showing the actual in place installation of all piping and equipment installed under this Section at a scale satisfactory to the Owner. The drawings shall reflect all of the piping Work on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the piping systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.
- B. Storage and Protection:
 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.
- C. Acceptance at Site:
 1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

- A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.
- B. The Drawings show an indication of the arrangement of equipment, ducts, valves, etc., and are as nearly correct as can be determined in advance of the actual construction of the Work. Piping, equipment, ducts, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions, without additional cost to the Owner.
- C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged to suit the requirements of each case, adequately provide for expansion and perfect circulation and minimize the amount of space required for the same.
- D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, Contractor, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the Engineer.
- E. The Drawings do not show, all offsets, fittings, accessories and details, which may be required. Contractor shall carefully examine all of the General

Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Copper Water Tube:

1. Tube:
 - a. Reference: ANSI H23.1, ASTM B 88.
 - b. Type: K or L.
 - c. Temper: Hard-drawn or soft-annealed.
2. Fittings:
 - a. Reference: ANSI B16.22.
 - b. Reference: ANSI B16.26.
 - c. Reference: ANSI B16.18.
3. Joints:
 - a. Sweat:
 - 1) Solder Metal: ASTM B 32, Type 95-5TA.
 - 2) Flux: FS O-F-506, Type 1.
 - b. Flanged:
 - 1) Flanges: ANSI B16.24, 150 lb. class.
 - 2) Gaskets: Red rubber, ASTM D 1330, Grade 1, 1/8-inch thick.
 - 3) Nuts and Bolts: ASTM A 307.
4. Unions:
 - a. Reference: FS WW-U-516.
 - b. Material: Bronze.
 - c. Rating: 250 lb. W.O.G.

B. Ductile Iron Pipe:

1. Pipe: Ductile-iron, ANSI A21.51.
2. Fittings: Ductile-iron, ANSI A21.1.
3. Joints:
 - a. Mechanical Joints:
 - 1) Glands, Bolts and Nuts: ANSI A21.11.
 - b. Flanged Joints:
 - 1) Reference: ANSI A21.10.
4. Lining: Mortar lined, ANSI A21.4.

C. Dielectric Couplings:

1. Manufacturers: Provide products of one of the following:
 - a. Watts Regulator Company.
 - b. Epco Sales, Incorporated.
 - c. Or equal.

2. Type: Union or flange.
3. Ratings:
 - a. Unions: 250 psi, ANSI B16.39.
 - b. Flanges: 175 psi, ANSI B16.42 (Iron), ANSI B16.24 (Bronze).

2.2 VALVES

A. Bronze Body Globe Valves:

1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. No. B-24.
 - b. Lunkenheimer Company, Fig. No. 126.
 - c. Or equal.
2. Type: Composition disc, union bonnet.
3. Materials: Brass and bronze.
4. Rating: 150 lb. SWP.
5. End Connections: Solder joint.

B. Bronze Body Check Valves:

1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. No. B-309.
 - b. Lunkenheimer Company, Fig. No. 2145.
 - c. Or equal.
2. Type: Swing, regrinding bronze disc, screw-in cap.
3. Materials: Brass and bronze.
4. Rating: 150 lb. SWP.
5. End Connections: Solder joint.

C. Bronze Body Ball Valves:

1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. S-217 BR-R-T.
 - b. Lunkenheimer Company, Fig. 707-XLT.
 - c. Or equal.
2. Type: Non-blowout stem, adjustable packing gland, quarter turn, full port ball valve.
3. Materials:
 - a. Body: Cast bronze.
 - b. Ball: Chrome plated brass.
 - c. Packing and Seats: Teflon.
4. Rating: 150 lb. SWP.
5. End Connections: Screwed. Provide screwed to sweat adapters, where required.

D. Strainers:

1. Manufacturers: Provide products of one of the following:
 - a. Mueller Steam Specialty Company.
 - b. Armstrong Steam Specialty Company.
 - c. Or equal.
2. Type: Self-cleaning wye body with blow-off cock.

3. Construction:
 - a. Basket: Perforated stainless steel basket.
 - b. Perforations: 0.045-inches diameter, minimum.
 - c. Free Area: Four times, cross sectional area of connecting pipe, minimum.
 4. Strainers 2-1/2-inch and smaller:
 - a. Materials:
 - 1) Body: Cast bronze, ASTM B 62.
 - b. Pressure Rating: 250 psi steam at 425°F temperature.
 - c. End Connections: Solder ends or screwed ends with adapters for screw to sweat ends.
 - d. Blowoff Connection: Unplugged, NPT blowoff connection.
 5. Strainers 3-Inches and Larger:
 - a. Construction:
 - 1) Body: Cast-iron, ASTM A 126.
 - b. Pressure Rating: 125 psi steam.
 - c. End Connections: Flanged ANSI B16.1 drilling.
 - d. Blowoff Connections: Tapped, NPT, unplugged.
 6. Provide short nipple and blowoff valve for each strainer.
- E. Iron Body Gate Valves:
1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. No. G-623.
 - b. Lunkenheimer Company, Fig. No. 1430.
 - c. Or equal.
 2. Type: Rising stem, outside screw and yoke, solid wedge.
 3. Materials: Iron with bronze trim.
 4. Rating: 125 lb. SWP.
 5. End Connections: Flanged, ANSI B16.1 drilling.
 6. Provide chain wheel operators for all valves above 5 foot-6 inches above finished floor.
- F. Iron Body Check Valves:
1. Products and Manufacturers: Provide one of the following:
 - a. Stockham Valves and Fittings, Fig. No. G-931.
 - b. Lunkenheimer Company, Fig. No. 1790.
 - c. Or equal.
 2. Type: Swing, regrind-renew disc and seat ring, bolted cover.
 3. Materials: Iron body, bronze trim, bronze disc and seat ring.
 4. Rating: 125 lb. SWP.
 5. End Connections: Flanged, ANSI B16.1 drilling.
- G. Tempering Valve:
1. Manufacturers: Provide products of one of the following:
 - a. Holby Valve Company, Incorporated.
 - b. Heat-Timer Corporation.
 - c. Or equal.
 2. Type: Thermostatically operated water-blending device.

3. Materials:
 - a. Body: Brass.
 - b. Vanes: Brass.
 4. Thermostatic element to be located in main body of valve.
 5. Water blending chamber to be 23-inches long.
 6. Low outlet temperature type valve shall be adjustable from 60 to 110°F.
 7. Test Pressure: 300 psi.
- H. Tepid Water Mixing Valve:
1. Manufacturers: Provide products of one of the following:
 - a. Haws Corporation, Model No. TWBS.HS.
 - b. Leonard Water Temperature Controls, Model No. TM-650-STSTL-EXP.
 - c. Or equal.
 2. Type: Thermostatically operated water-blending device.
 3. Materials:
 - a. Body: Brass.
 - b. Vanes: Brass.
 - c. Cabinet: Stainless steel.
 4. Thermostatic element to be located in main body of valve.
 5. Outlet dial thermometer.
 6. Locking temperature regulator set at 85°F.
 7. Internal cold water bypass and temperature override protection.
 8. Maximum Supply Pressure: 125 psi.
 9. Maximum Supply Temperature: 180°F.
 10. Reference: ANSI Z358-1.

2.3 EQUIPMENT

- A. Hose Bibbs, Pipe Drains:
1. Products and Manufacturers: Provide one of the following:
 - a. Woodford Manufacturing Company, Model 24C.
 - b. Nibco, Incorporated, Fig. No. 74VB.
 - c. Or equal.
 2. Valve:
 - a. Type: Indoor/non-freeze area boiler drain globe valve, chrome plated.
 - b. Materials: Bronze body, screwed bonnet, renewable composition disc.
 - c. End Connections: Hose thread outlet, male pipe thread or sweat inlet.
 - d. Rating: 125 lbs. WOG.
 3. Vacuum Breaker:
 - a. Type: Non-removable, atmospheric.
 - b. Materials: Brass body, stainless steel trim, silicone rubber diaphragm and disc.
 - c. End Connections: Hose thread inlet and outlet.
- B. Wall Hydrants:
1. Exposed Hose Connection, Non-Freeze Type:
 - a. Products and Manufacturers: Provide one of the following:

- 1) Jay R. Smith, Fig. No. 5609-SE.
- 2) Zurn Industries, Fig. No. Z-1310.
- 3) Or equal.
- b. Type: Anti-siphon, non-freeze wall hydrant.
- c. Materials:
 - 1) Casing: Bronze.
 - 2) Vacuum Breaker: Integral.
 - 3) Threads: Standard 3/4-inch hose thread outlet.
 - 4) Wall Clamp: Adjustable with set screw.
 - 5) Key: Removable tee handle type.
- d. Connections: 3/4-inch sweat end inlet and 3/4-inch hose thread outlet, universal type.

C. Post Hydrants:

1. Exposed Hose Connection, Non-Freeze Type:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Jay R. Smith, Fig. No. 5910.
 - 2) Zurn Industries, Fig. No. Z-1385.
 - 3) Or equal.
 - b. Type: Anti-siphon, non-freeze wall hydrant.
 - c. Materials:
 - 1) Casing: Bronze.
 - 2) Vacuum Breaker: Integral.
 - 3) Threads: Standard 3/4-inch hose thread outlet.
 - 4) Wall Clamp: Adjustable with set screw.
 - 5) Key: Removable tee handle type.
 - d. Connection: 3/4-inch sweat end inlet and 3/4-inch hose thread outlet, universal type.
 - e. Drain: 1/8-inch NPT drain hole.
 - f. Post Height to Hose Connection: 30-inches above finished ground elevation.

D. Post Hydrants:

1. Exposed Hose Connection, Non-Freeze Type:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Zurn Industries, Fig. No. Z-1390.
 - 2) Or equal.
 - b. Type: Anti-siphon, non-freeze wall hydrant.
 - c. Materials:
 - 1) Casing: Bronze.
 - 2) Vacuum Breaker: Integral.
 - 3) Threads: Two-inch hose thread outlet.
 - 4) Wall Clamp: Adjustable with set screw.
 - 5) Key: Removable tee handle type.
 - d. Connection: Two-inch sweat end inlet and 2-inch hose thread outlet, universal type.
 - e. Drain: 1/8-inch NPT drain hole.

- f. Post Height to Hose Connection: 30-inches above finished ground elevation.
- E. Pipe Labels:
 - 1. Type: Self-adhering, temperature resistant, waterproof, corrosion resistant.
 - 2. Marker size, marker color, legend size, and legend color shall conform to ANSI A13.1.
- F. Flexible Connections:
 - 1. Manufacturers: Provide products of one of the following:
 - a. Flexonics, Incorporated.
 - b. Anaconda Metal Hose Division, Anamet, Incorporated.
 - c. Or equal.
 - 2. Type: Flexible connections for piping 2-1/2-inches and smaller.
 - 3. Construction:
 - a. Hose: Bronze.
 - b. Braid: Bronze.
 - 4. Pressure Ratings: 190 psig working pressure at 250°F temperature.
 - 5. End Connections: Solder end welded to hose and braid ends.

2.4 PAINTING

- A. Piping and accessories shall be painted in accordance with Section 09 91 00, Painting.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install all items as shown, specified, and as recommended by the manufacturers.
 - 2. Request instructions from Engineer, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.
 - 3. Present conflicts between piping systems and/or equipment and/or structures to Engineer, in writing, who will determine corrective measures to be taken.
 - 4. Do not modify structures to facilitate installation of piping, unless specifically approved by Engineer.
 - 5. Installation shall conform to requirements of all local and state codes.
 - 6. Properly plug or cap the open ends of all piping at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

- A. Field Tests:

1. Fill all systems and fully test all equipment, valves, dampers, etc. in operation.
2. Check for excessive vibration while all systems are operating.
3. Installed systems and components will not be released to Owner, unless all systems have been tested and approved by the Engineer.

B. Inspection:

1. Examine areas to receive piping, valves and accessories for:
 - a. Defects that adversely affect execution and quality of the Work.
 - b. Deviations beyond allowable tolerances for piping, valves and accessories.
 - c. Start the Work only when conditions are satisfactory.
2. The Engineer reserves the right to reject or authorize replacement of piping and accessories found to defective.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust all controls for proper settings.
2. While system is operable balance all equipment, valves, dampers, etc. to achieve design conditions.

B. Cleaning:

1. Thoroughly clean all piping, fittings, valves, and accessories prior to installation.
2. Remove all dirt, rust, dust, etc. from piping in preparation for painting.
3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MATERIAL SCHEDULES

A. Piping:

1. Use types of pipe and fittings as specified below, unless otherwise specified or shown.
2. All potable water supply, hot, cold, tepid and hot water circulation piping 2-1/2-inches and smaller, run within the interior of a building, shall be hard-drawn copper Type "L" with solder joints and connections.
3. All potable water piping 2-1/2-inches and smaller run underground shall be soft-annealed copper Type "K" copper tubing.
4. All underground water piping 3-inches and larger shall be cement-lined ductile iron pipe with mechanical joints.
5. All water piping 3-inches and larger run within the interior of a building, shall be cement-lined ductile iron pipe with flanged or grooved joints.
6. All exposed water piping and valves to plumbing fixtures shall be chrome-plated brass.
7. All valves for copper or brass piping shall be bronze bodied, unless otherwise specified.

8. All valves for ductile iron piping shall be iron bodied, unless otherwise specified.
9. Use “wrought copper” fittings for copper tubing.
10. Use “butt welded” fittings for welded steel pipe connections.

+ + END OF SECTION + +

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install hangers and supports and required appurtenances for HVAC piping and equipment as required to complete the Work.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the hangers and supports Work.
2. Notify other contractors in advance of the installation of the hangers and supports to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the hangers and supports Work.

C. Related Sections:

1. Applicable Sections of Division 23, HVAC.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American National Standards Institute, (ANSI).
 - a. ANSI B1.1, Unified Inch Screw Threads, (ASME B1.1).
2. American Society for Testing and Materials, (ASTM).
 - a. ASTM A 36/A 36M, Specification for Carbon Structural Steel.
 - b. ASTM A 47/A 47 M, Specification for Ferritic Malleable Iron Castings.
 - c. ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - d. ASTM A 575, Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - e. ASTM A 668/A 688M, Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
3. Federal Specifications, (FS).
 - a. FS WW-H-171, Hangers and Supports, Pipe.
4. Manufacturer Standardization Society, (MSS).
 - a. MSS SP 58, Pipe Hangers and Supports-Materials, Design and Manufacture.
 - b. MSS SP 69, Pipe Hangers and Supports - Selection and Application.
5. Underwriters' Laboratories, Incorporated, (UL).

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Manufacturer shall have a minimum of five years of experience of producing substantially similar equipment, and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
- B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
 - 1. American National Standards Institute, (ANSI).
 - 2. Institute of Electrical and Electronic Engineers, (IEEE).
 - 3. National Electrical Code, (NEC).
 - 4. National Electrical Manufacturers' Association, (NEMA).
 - 5. National Fire Protection Association, (NFPA).
 - 6. Underwriters Laboratories, Incorporated, (UL).
 - 7. Local and State Building Codes and Ordinances.
 - 8. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.
- C. Component Supply and Compatibility:
 - 1. Obtain all equipment included in this Section, regardless of the component manufacturer, from a single hangers and supports manufacturer.
 - 2. Require the hangers and supports manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
 - 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment assembly by the hangers and supports manufacturer.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Product Data:
 - a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
 - b. Load ratings, materials and installation shall be consistent with the recommendations of the MSS SP 58 and MSS SP 69 and Federal Specification WW-H-171, latest edition.
 - 2. Shop Drawings
 - a. Drawings showing fabrication methods, assembly, accessories, installation details.
 - b. All hangers, inserts and supports for piping system specified.
 - c. Location, installation, material, loads or forces, and deflection of all hangers and supports.
 - d. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.

e. Deviations from Contract Documents.

B. Informational Submittals: Submit the following:

1. Source Quality Control Submittals:
 - a. Submit factory test reports.
2. Certificates:
 - a. Submit independent certification reports.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.

B. Storage of Materials:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

1.6 WARRANTY

A. Completed equipment systems shall carry manufacturer's warranty

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. The manufacturer shall conform to the following criteria:

1. Designs generally accepted as exemplifying good engineering practice, using stock or production parts, shall be utilized wherever possible.
2. Accurate weight balance calculations shall be made to determine the required supporting force at each hanger location and the pipe weight load at each equipment concentration.
3. Pipe hangers shall be capable of supporting the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and

- prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.
4. Hangers shall be designed so that they cannot become disengaged by movements of the supported pipe.
- B. Components of hangers and supports shall conform to the following:
1. Materials:
 - a. Bolts: ASTM A 307, Grade A, unless otherwise specified below.
 - b. Forgings: ASTM A 668/A 688M.
 - c. Malleable Iron: ASTM A 47/A 47 M.
 - d. Rods and Bars: ASTM A 575.
 - e. Threads: Unified Screw Threads, Class 2A and 2B, ANSI B1.1.
 - f. Structural Steel: ASTM A 36/A 36M.
 2. Finish:
 - a. Steel or malleable iron items, framing members, hangers, rods, bolts, nuts, inserts, washers and appurtenances located in corrosive areas shall be Type 316 stainless steel and those located in non-corrosive areas shall be galvanized steel. Refer to the corrosive and non-corrosive designation table on the Drawings for a list of these areas.
 - b. Steel or malleable iron materials used for the support of uninsulated copper piping or plastic piping shall be PVC coated.
- C. Pipe Attachments: The following types of pipe attachments shall be considered acceptable:
1. Adjustable Steel Clevis: FS WW-H-171E, Type 1.
 2. Steel Double Bolt Pipe Clamp: FS WW-H-171E, Type 3.
 3. Steel Pipe Clamp: FS WW-H-171E, Type 4.
 4. Adjustable Swivel Pipe Ring: FS WW-H-171E, Type 6.
 5. Adjustable Steel Band Hanger: FS WW-H-171E, Type 7.
 6. Riser Clamp: FS WW-H-171E, Type 8.
 7. Light-Duty Clevis Hanger: FS WW-H-171E, Type 12.
 8. Long Clips: FS WW-H-171E, Type 26.
 9. Offset J-Hooks: FS WW-H-171E, Type 27.
 10. Steel Pipe Covering Protection Saddle: FS WW-H-171E, Type 40A.
 11. Insulation Protection Shield: FS WW-H-171E, Type 41.
 12. Pipe Saddle Support: FS WW-H-171E, Type 37.
 13. Pipe Stanchion Saddle: FS WW-H-171E, Type 38.
 14. Pipe Saddle Support with Base: FS WW-H-171E, Type 36.
 15. Adjustable Roller Hanger: FS WW-H-171E, Type 42.
- D. Structural Attachments: The following types of structural attachments shall be considered acceptable:
1. Side Beam Clamp: FS WW-H-171E, Type 20.
 2. Center I-Beam Clamp: FS WW-H-171E, Type 21.
 3. Welded Steel Bracket: FS WW-H-171E, Types 32 and 33.
 4. Side Beam Bracket: FS WW-H-171E, Type 35.
 5. Malleable Iron with Galvanized Finish Concrete Insert: FS WW-H-171E, Type 18. Steel inserts are NOT acceptable.

- E. Hanger Rod Attachments: Use as required to complete assembly:
 - 1. Forged Steel Clevis: FS WW-H-171E, Type 14.
 - 2. Adjustable Turnbuckle: FS WW-H-171E, Type 15.
 - 3. Forged Steel Welders Eye Nut: FS WW-H-171E, Type 17.\

2.2 SOURCE QUALITY CONTROL

- A. Source Quality Control:
 - 1. Equipment shall be completely manufactured and pre-assembled in accordance with Reference Standards.
 - 2. Tested and inspected for approval as a unit by Underwriters' Laboratories, Inc., UL Label.
 - 3. Factory test equipment to ensure that the entire package has been properly fabricated and assembled, that all the controls function as specified herein and that the package meets the specified performance requirements including manufacturer's data report.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install all items as shown, specified, and as recommended by the manufacturer.
 - 2. Request instructions from Engineer, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.
 - 3. Present conflicts between equipment and structures to Engineer who shall determine corrective measures to be taken.
 - 4. Do not modify structures to facilitate installation of equipment, unless specifically approved by Engineer.
 - 5. Installation to conform to requirements of all local and state codes.
 - 6. Insulated pipes with vapor barriers shall have an insulation protection shield conforming to FS WW-H-171E, Type 41 tack-welded to hanger.
 - 7. Insulated pipes without vapor barriers shall have a steel protection saddle conforming to FS WW-H-171E, Type 40A.
 - 8. All uninsulated copper piping shall be supported by plastic coated steel pipe attachments.
 - 9. All piping shall be braced as required, to prevent sway in any direction.
 - 10. All insulated piping 3-inch diameter and larger shall be supported by roller hangers conforming to FS WW-H-171E, Type 42.
- B. Supports and Hangers for Horizontal Pipes:
 - 1. Space supports and hangers for all piping no farther apart than shown below, unless otherwise shown:
 - a. Copper Tube:
 - 1) All Pipes: 6 feet-0 inch center.
 - b. Steel Pipe:

- 1) Pipes up to 1-inch: 6 feet-0 inch center.
- 2) Pipes 1-1/4-inch to 6-inch: 8 feet-0 inch center.
2. Additional supports shall be placed immediately adjacent to any change in piping direction, and on both sides of valves and couplings.
- C. Hanger Rods: Size hanger rods according to the schedule below, unless noted otherwise:

Nominal Pipe (Inches)	Rod Diameter (Inches)
1/2 through 2 3/8	
2-1/2 through 3-1/2	1/2
4 through 5	5/8
6	3/4

- D. Supports for Vertical Piping:
 1. Provide riser clamp placed under hub, fitting or coupling with approved solid bearing on steel sleeve at each floor level.
 2. Where riser clamps are used with plastic piping they shall be modified so as not to exert any compressive forces on the pipe.
 3. Support spacing shall not exceed code requirements.
 4. Piping support intervals shall not exceed those listed in Paragraph 3.2.B., above.
 5. Additional supports shall be placed immediately adjacent to any change in piping direction, and on both sides of valves and couplings.
- E. Allow clearances for expansion and contraction of piping.

3.2 FIELD QUALITY CONTROL

- A. Field Tests:
 1. Test all equipment in operation.
 2. Check for excessive vibration while all systems are operating.
 3. Installed systems and components shall not be released to Owner unless all systems have been tested and approved by the Engineer.
- B. Inspection:
 1. Examine areas to receive equipment and accessories for:
 - a. Defects that adversely affect execution and quality of the Work.
 - b. Deviations beyond allowable tolerances.
 - c. Start the Work only when conditions are satisfactory.
 2. The Engineer reserves the right to reject and/or authorize replacement of equipment and accessories found to be defective, blistered, cracked and/or deviated from allowable tolerances.

3.3 ADJUSTING AND CLEANING

- A. Adjusting:

1. Adjust all equipment.
- B. Cleaning:
1. Thoroughly clean all equipment and accessories prior to installation.
 2. Remove all dirt, rust, dust, etc. from equipment.
 3. Remove and dispose of all debris and waste from the Site resulting from installation.

+ + END OF SECTION + +

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to perform the testing, adjusting and balancing for HVAC as specified herein.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the testing, adjusting and balancing for HVAC Work.
2. Notify other contractors in advance of the installation of the testing, adjusting and balancing for HVAC to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the testing, adjusting and balancing for HVAC Work.

C. Related Sections:

1. Section 09 91 00, Painting.

1.2 QUALITY ASSURANCE

A. Balancer's Qualifications:

1. Balancer shall have a minimum of five years of experience of testing, adjusting and balancing substantially similar equipment, and shall be able to show evidence of at least five adjustments in satisfactory operation for at least five years.
2. Submit biographical information on employee proposed to directly supervise the testing, adjusting and balancing for HVAC Work.
3. Submit proof of certification by National Environmental Balancing Bureau (NEBB) and/or Association Air Balance Council (AABC).

B. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Associated Air Balance Council, (AABC).
2. Air Moving and Conditioning Association, (AMCA).
3. American National Standards Institute, (ANSI).
4. American Refrigeration Institute, (ARI).
5. Institute of Electrical and Electronic Engineers, (IEEE).
6. National Electrical Code, (NEC).
7. National Electrical Manufacturers' Association, (NEMA).
8. National Environmental Balancing Bureau, (NEBB).

9. National Fire Protection Association, (NFPA).
10. Sheet Metal and Air Conditioning Contractors' National Association, (SMACNA).
11. Underwriters' Laboratories, Incorporated, (UL).
12. Local and State Building Codes and Ordinances.
13. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Submit samples of data sheets on each item of equipment.
 - b. Submit data sheets on each item of testing equipment required.
 - c. Include name of devices, manufacturer's name, model number, latest date of calibration and correction factors.
 - d. Valve Charts:
 - 1) Frame and Glazing: 1/8-inch sheet acrylic in 8-1/2 by 11-inch extruded aluminum frame.
 - 2) Charts: Typed with the following information on each valve:
 - a) Valve identification number.
 - b) Valve location.
 - c) Valve use.
 - d) Valve size.
 - e) Manufacturer's name and model.
 - 3) Valve Tags: Submit sample of valve tag with sample identification lettering.

B. Informational Submittals: Submit the following:

1. Site Quality Control Submittals:
 - a. Submit specimen copies of report forms for Engineer's review.
 - b. Forms shall be 8-1/2 by 11-inch paper for loose-leaf binding, with blanks for listing all required testing ratings and certification of report.
 - c. Reports shall be on the organizations approved forms imprinted with the company's name.
 - d. Certified report, outlining procedure used to balance the system and the types of measuring devices used.
 - e. Submit test results on approved forms in typed format.
 - f. Submit a minimum of three certified copies of required test reports to the Engineer for review.
2. Qualifications Statements:
 - a. Submit balancer's qualifications

C. Closeout Submittals: Submit the following

1. Operations and Maintenance Manuals:
 - a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.

- b. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01 78 23, Operations and Maintenance Data.

1.4 OPERATING INSTRUCTIONS

- A. Written startup and field test reports must be submitted to Engineer and Owner for approval prior to Owner's acceptance for responsibility.

1.5 CORRECTIVE ADJUSTMENTS

- A. Should corrective measures caused by faulty installation require re-testing, adjusting and balancing, such Work shall be at no additional cost to the Owner.
- B. Inspections:
 - 1. Inspect all equipment for proper operation prior to testing, adjusting and balancing.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Contractor shall provide all necessary instrumentation, tools, ladders, etc. to complete all air and hydronic balancing tests and adjustments.
- B. Instrumentation shall be in accordance with NEBB, AABC, or SMACNA requirements and shall be calibrated to the accuracy standards demanded by these organizations.
- C. Flow-measuring hoods (manufactured, not fabricated) shall be acceptable for measurement of ceiling diffuser performance only.
- D. Contractor shall assume full responsibility for safe keeping of all instrumentation during the course of the Work.

2.4 SYSTEM PERFORMANCE MEASURING INSTRUMENTS

- A. Provide insertion thermometers, sling psychrometers, tachometers, revolution counters, clamp-on volt-ammeter recorders, and other instruments as required to measure all facets of the complete HVAC system performance.

PART 3 – EXECUTION

3.1 GENERAL

- A. All testing, adjusting, and balancing of air systems shall be performed in compliance with the standard procedure manual published by the testing, adjusting,

and balancing organization affiliated with Contractor. Contractor shall submit one copy of the standard procedure manual to the Engineer for their records.

- B. Contractor shall be solely responsible for the protection and safeguarding of the Work and shall provide every protection against accidents, injury, and damage to persons and property.
- C. Contractor shall keep dust, dirt, and debris to an absolute minimum and reinstall all removed ceiling components to their original positions at the end of each day's Work.
- D. Contractor shall be fully responsible for removal and reinstallation of ceiling system and replacement of any component damaged.
- E. Contractor shall install additional access panels at no extra cost to the Owner, as is required to gain access to equipment concealed above ceilings, behind walls, or any other concealed space.
- F. Air systems shall be tested, adjusted, and balanced with clean filters.

3.2 JOB CONDITIONS

- A. Heating, ventilating and air conditioning equipment shall be completely installed and in continuous operation, as required, to accomplish the testing, adjusting and balancing Work specified.
- B. Testing, adjusting and balancing shall be performed when outside ambient conditions are approximate to the design conditions for all heating and cooling functions.
- D. Test, adjust and balance all air systems, ductwork, etc. and their control systems.

3.3 INSPECTION

- A. Pre-Startup Inspection:
 - 1. Verify proper equipment mounting and setting.
 - 2. Verify that control, interlock and power wiring is complete.
 - 3. Verify alignment of motors and drives.
 - 4. Verify proper piping connections and accessories.
 - 5. Verify that lubrication is completed.
- B. First Run Observations:
 - 1. Verify direction of rotation.
 - 2. Verify setting of safety controls.
 - 3. Monitor heat build-up in bearings.
 - 4. Check motor loads against nameplate data.
- C. Equipment Check:

1. Verify proper overload heater sizes.
2. Verify function of safety and operating controls.
3. Verify proper operation of equipment.
4. Report on inspection, observation and checking procedures.

3.4 AIR SYSTEMS

- A. Test, adjust and balance systems in accord with the AABC “National Standards for Field Measurements, Total System Balance, Air Distribution, Hydronics Systems”, Volume One, Number 81266, or SMACNA's “Air Handling” Specification.
- B. Preliminary:
1. Identify and list size, type and manufacturer of all equipment to be tested, including air terminals.
- C. Central Systems:
1. Test rpm for all equipment, including adjusting of each fan, air handling unit, and air conditioning unit to design requirements within the limits of mechanical equipment provided.
 2. Test and record motor voltages and running amperes including motor nameplate data, and starter heater ratings for each unit as listed above.
 3. Make pitot tube traverse of main supply, exhaust and return ducts, determine cfm at all fans and units and adjust fans and units to within five percent of design requirements.
 4. Test and record system static pressure, suction and discharge.
 5. Test and adjust system for design outside air, (cfm).
 6. Test and adjust system for design recirculated air, (cfm).
 7. Test and record heating apparatus entering air temperatures, (dry bulb).
 8. Test and record cooling apparatus entering air temperatures, (dry bulb and wet bulb).
 9. Test and record heating apparatus leaving air temperatures, (dry bulb).
 10. Test and record cooling apparatus leaving air temperatures, (dry bulb and wet bulb).
 11. Record all fan and air handling unit speeds.
 12. Record air quantity delivered by each fan and air-handling unit.
- D. Distribution:
1. Adjust volume dampers, control dampers, splitter dampers, etc., to proper design CFM in main ducts, branch ducts, and zones.
- E. Air Terminals:
1. Identify each air terminal as to location and determine required flow reading.
 2. Test and adjust each air terminal to within tolerance of design requirements as listed below.
 - a. Diffusers and Supply Registers: 0 percent to +10 percent.
 - b. Return Registers: 0 percent to -10 percent.
 - c. Exhaust Registers: 0 percent to -10 percent.

3. Test procedure on air terminals shall include recording comparison of required cfm and observed cfm, adjustment of terminal, and recording of final cfm.
4. Adjust flow patterns from air terminal units to minimize drafts to the extent that the design and equipment permits.

F. Verification:

1. Prepare summation of readings of observed cfm for each system, compare with required cfm, and verify that duct losses are within specified allowable range.
2. Verify design cfm at fans as described above.
3. If the air systems are not properly balanced, Contractor shall rebalance and recheck all data in the presence of the Engineer and as accepted by the Engineer.

3.6 AUTOMATIC CONTROL SYSTEM

- A. In cooperation with the control manufacturer's representative, set and adjust automatically operated devices to achieve required sequence of operations.
- B. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by control system installer.

3.7 MAINTENANCE AND REPAIR

A. Maintenance and Repair:

1. Provide all labor, tools and equipment to provide a Preventive Maintenance Program and make repairs for all equipment and controls during the one-year correction period after the Final Acceptance by Owner. Contractor shall provide the following services for the same period of one year:
 - a. Receive calls for all problems and take steps to immediately correct deficiencies, which may exist.
 - b. Provide a monthly inspection of all equipment, and record the findings on a checklist hereinafter specified.
 - c. Provide a Preventive Maintenance Schedule for the principle items of equipment.
 - d. Respond to Owner and make repairs for all equipment and controls within 24-hours of notification by Owner.

B. Check List:

1. Provide a checklist and post a copy of it, where directed by the Owner.
2. Include each piece of equipment specified or shown.
3. Provide four columns for required quarterly inspections.
4. Provide columns for the following:
 - a. Equipment condition.
 - b. Equipment operation.
 - c. Equipment lubrication.
 - d. Preventive maintenance.

5. Preventive maintenance shall be performed in accordance with the manufacturer's recommendations and accepted practice.

3.8 MANUFACTURER'S SERVICES

- A. A factory trained representative shall be provided for installation supervision, start-up and test services and operation and maintenance personnel training services. The representative shall make a minimum of one visits, minimum 4 hours on-Site for each visit, to the Site. The first visit shall be for assistance in the installation of equipment. Subsequent visit shall be for checking the completed installation, start-up of the system. Manufacturer's representative shall test operate the system in the presence of the Engineer and verify that the equipment conforms to the requirements. Representative shall revisit the Site as often as necessary until all trouble is corrected and the installation is entirely satisfactory.
- B. All costs, including travel, lodging, meals and incidentals, for additional visits shall be at no additional cost to the Owner.

+ + END OF SECTION + +

SECTION 23 51 33

INSULATED SECTIONAL CHIMNEYS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install insulated sectional chimney systems complete with accessories.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the insulated sectional chimneys Work.
2. Notify other contractors in advance of the installation of the insulated sectional chimneys to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the insulated sectional chimneys Work.

C. Related Sections:

1. Division 23, Heating, Ventilating and Air Conditioning.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American Society of Heating, Refrigerating and Air Conditioning Engineers, (ASHRAE).
2. Institute of Electrical and Electronic Engineers, (IEEE).
3. National Electrical Code, (NEC).
4. National Electrical Manufacturers' Association, (NEMA).
5. National Fire Protection Association, (NFPA).
 - a. NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.
 - b. NFPA 211, Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
6. Sheet Metal and Air Conditioning Contractors National Association, (SMACNA).
7. Underwriters' Laboratories, Incorporated, (UL).
 - a. UL 103, Factory-Built Chimneys for Residential Type and Building Heating Appliances.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications:

1. Engage a single installer regularly engaged in insulated sectional chimney systems installation and with experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and experience in this type of Work. Submit name and qualifications to Engineer.
 2. Engage a single installer for the entire insulated sectional chimney system with undivided responsibility for performance and other requirements.
- B. Component Supply and Compatibility:
1. Obtain all equipment included in this Section, regardless of the component manufacturer, from a single insulated sectional chimney manufacturer.
 2. The insulated sectional chimney equipment manufacturer to review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.
 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the insulated sectional chimney equipment manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. American National Standards Institute, (ANSI).
 2. Institute of Electrical and Electronic Engineers, (IEEE).
 3. National Electrical Code, (NEC).
 4. National Electrical Manufacturers' Association, (NEMA).
 5. National Fire Protection Association, (NFPA).
 6. Underwriters' Laboratories, Incorporated, (UL).
 7. Local and State Building Codes and Ordinances.
 8. Listing Agency: A nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation, that maintains periodic inspection of production of equipment and materials and publishes list stating either that the equipment or material listed meets nationally recognized standards or has been tested and found suitable for use in a specified manner.
 9. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. 1/4-inch scale layouts, dimensioned to show length of runs, sizes, support spacing and expansion provisions.
 - b. Details of chimney connection to boilers and chimney supports from boilers.
 - c. Details of installation.
 - d. Supports.
 - e. Roof penetration and termination.
 2. Product Data:

- a. Manufacturer's literature, illustrations, specifications and engineering data for all equipment.
 - b. Total chimney weight supported from boiler top.
 - c. Other technical data related to the specified material and equipment as requested by Engineer.
 - d. Contractor shall provide certification that all stainless steel, accessories and hardware are of the specified type.
- B. Informational Submittals: Submit the following:
 - 1. Qualifications Statements:
 - a. Installer's qualifications.
- C. Closeout Submittals: Submit the following:
 - 1. Record Documentation:
 - a. During progress of the Work keep an up-to-date set of the Drawings showing field and Shop Drawing modifications. Immediately upon completion of the Work, submit CADD drawings showing the actual-in-place installation of all chimney systems installed under this Section, at a scale satisfactory to the Owner. The drawings shall show all chimney systems on plans and in sections, with all reference dimensions and elevations required for complete Record Drawings of the systems. Two paper prints shall also be furnished. The prints and electronic copies of the CADD files shall be furnished no later than 30 days after completion of the Contract and prior to final payment.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
 - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.
- B. Storage and Protection:
 - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 - 2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.
- C. Acceptance at Site:
 - 1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

1.6 GENERAL REQUIREMENTS

- A. The Contract Documents show the general arrangement and extent of the Work to be completed. The exact location and arrangement of all parts shall be determined as the Work progresses. The exact location of all parts of the Work must be governed by the general building plans and the actual building conditions.
- B. The Drawings show an indication of the arrangement of equipment and chimney system and is as correct as can be determined in advance of the actual construction of the Work. Equipment, chimney systems, and appurtenances found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc., must be changed in location to clear such obstructions.
- C. The connections shown to the various units are intended as an indication only. The actual connections at the time of installation to be made and arranged as to fully and best suit the requirements of each particular case, adequately provide for expansion and minimize the amount of space required for the same.
- D. The Drawings show the general arrangement of all systems. Should local conditions necessitate rearrangement of one or more of the systems, Contractor, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval by the Engineer.
- E. The Drawings do not show all offsets, fittings, accessories and details, which may be required. Contractor shall carefully examine all of the General Construction, Electrical, Mechanical, Structural and other Drawings and the respective Specifications for conditions which may affect the installation of the Work, and shall arrange the Work accordingly, furnishing all required items to meet such conditions which are not specified as work "by others", to complete the systems to the true extent of the Contract Documents.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- A. Chimney venting system shall comply with the following minimum conditions:
 - 1. Chimney: Suitable for continuous temperatures up to 1,400°F or 1,800°F for brief periods.

2.2 MANUFACTURERS

- A. Products and Manufacturers: Provide one of the following:
 - 1. Schebler Corporation, Model P1.
 - 2. Metalbestos Products, Division of Wallace-Murray Corporation.
 - 3. Or equal.

2.3 DETAILS OF CONSTRUCTION

- A. Type:
 - 1. Double-walled.
 - 2. Prefabricated.
 - 3. One-inch insulation between inner and outer wall.
- B. Materials and Thickness:
 - 1. Chimney:
 - a. Inner Wall:
 - 1) Stainless Steel: Type 316.
 - 2) 6-inch through 36-inch Diameter: 0.036-inch.
 - 3) 38-inch through 48-inch: 0.048-inch.
 - b. Outer Wall:
 - 1) Stainless Steel: Type 304, except where located outdoors, which shall be Type 316.
 - 2) 6-inch through 36-inch Diameter: 0.030-inch.
 - 3) 38-inch through 48-inch: 0.048-inch.
 - 2. Insulation:
 - a. One-inch.
 - b. Rated for 1,600°F.
 - c. Low conductivity ceramic fiber.
 - d. Securely attached to the inner shell with steel straps and insulating pins welded to the inner shell.
- C. Construction:
 - 1. All inner and outer shell seams shall be full penetration welded the entire length of the pipe section.
 - 2. Riveted, tack or spot welded seams are not permitted.
 - 3. Stainless steel centering clips shall be welded to the outer shell to maintain 1-inch spacing and ensure concentricity of the shells.
- D. Accessories:
 - 1. Provide all fittings, components and structural supports required for a complete and operational chimney system, including but not limited to the following.
 - a. Rain cap.
 - b. Rain collar.
 - c. Roof flashing.
 - d. Roof support plate.
 - e. Elbows.
 - f. 45 degree lateral tees.
 - g. Reducers.
 - h. Wall guides.
 - i. Wall supports.
 - j. Adjustable sections.
 - k. Support plates.
 - l. Drain tee cap at base with 1-inch ball valve. Pipe drain to nearest floor drain.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install all items as shown, specified, and as recommended by the manufacturer.
2. Request instructions from Engineer, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.
3. Present conflicts between chimney systems or equipment or structures to Engineer, in writing, who shall determine corrective measures to be taken.
4. Do not modify structures to facilitate installation of chimney system, unless specifically approved by Engineer.
5. Installation to conform to requirements of all local and state codes.
6. Protection: Properly plug or cap the open ends of all chimney systems at the end of each day's Work or other stopping point through construction. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical damage.

B. All chimney systems shall conform accurately to the dimensions shown, the ducts shall be straight and smooth inside with joints neatly finished. Chimney systems shall be installed so as to preclude the possibility of vibration under all operating conditions.

C. Seal all joints in accordance with the manufacturer's standards.

D. Install all chimney systems and accessories to provide a system free from buckling, warping, breathing or vibration.

E. Provisions shall be made for supporting all chimney systems.

3.2 FIELD QUALITY CONTROL

A. Inspection:

1. Examine areas to receive chimney systems and accessories for:
 - a. Defects that adversely affect execution and quality of the Work.
 - b. Deviations beyond allowable tolerances.
 - c. Start the Work only when conditions are satisfactory.
2. The Engineer reserves the right to reject or authorize replacement of chimney systems and accessories found to be defective or deviated from allowable tolerances.

3.3 ADJUSTING AND CLEANING

A. Adjusting:

1. Adjust all controls for proper settings.

2. While system is operable, balance all equipment to achieve design conditions.
- B. Cleaning:
1. Thoroughly clean chimney systems and accessories prior to installation.
 2. Remove and dispose of all debris and waste from the Site resulting from installation.

+ + END OF SECTION + +

SECTION 23 82 39.63

GAS-FIRED UNIT HEATERS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install gas-fired unit heaters complete and operational with accessories, including mounting hardware and room thermostats for proper operation.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the gas-fired unit heater Work.
2. Notify other contractors in advance of the installation of the gas-fired unit heater to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, gas-fired unit heater Work.

C. Related Sections:

1. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. Air Moving and Conditioning Association, (AMCA).
 - a. AMCA 210, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
2. American Society of Heating, Refrigeration, Air Conditioning Association, (ASHRAE).

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer shall have a minimum of five years experience producing substantially similar equipment, and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.

B. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single gas-fired unit heater manufacturer.

2. The gas-fired unit heater equipment manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the gas-fired unit heater equipment manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. American National Standards Institute, (ANSI).
 2. Institute of Electrical and Electronic Engineers, (IEEE).
 3. National Electrical Code, (NEC).
 4. National Electrical Manufacturers' Association, (NEMA).
 5. National Fire Protection Association, (NFPA).
 6. Underwriters' Laboratories, Incorporated, (UL).
 7. Local and State Building Codes and Ordinances.
 8. Permits: Contractor shall obtain and pay for all required permits, fees and inspections.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Drawings showing fabrication methods, assembly, accessories, installation details and wiring diagrams.
 - b. Complete equipment list.
 - c. Detailed drawings of each individual component's wiring diagrams.
 - d. Detailed installation drawing of each individual component showing:
 - 1) Mounting requirements.
 - 2) Locations (panel, field, etc).
 - 3) Piping and wiring connections, labeled and coded.
 - 4) Instructions.
 - 5) Materials of construction.
 - 6) Data sheets.
 2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications, weight, dimensions, required clearances, materials of construction, and performance data for all equipment.
 - b. Other technical data related to specified material and equipment as requested by Engineer.
 - c. Detailed description of each component.
 - d. Catalog cut sheets.
 - e. Documentation from the manufacturer showing that paint systems will comply with Section 09 91 00. Include cut sheets for proposed paint systems.
 3. Testing Plans, Procedures, and Testing Limitations:
 - a. Fan to be tested in accordance with AMCA 210.

- B. Informational Submittals: Submit the following:
 - 1. Certificates:
 - a. Submit independent certification reports
 - 2. Supplier Instructions:
 - a. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.
 - 3. Source Quality Control Submittals:
 - a. Submit factory test reports.
- C. Closeout Submittals: Submit the following
 - 1. Operations and Maintenance Manuals:
 - a. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.
 - b. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01 78 23, Operations and Maintenance Data.
- D. Maintenance Material Submittals: Furnish the following:
 - 1. Spare Parts:
 - a. Spare parts list and recommended quantities.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
 - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to prevent delay of the Work.
- B. Storage and Protection:
 - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 - 2. Store all equipment in covered storage off the ground and prevent condensation and in accordance with the manufacturer's recommendations for long-term storage.
- C. Acceptance at Site:
 - 1. All boxes, crates and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer, in writing, if any loss or damage exists to equipment or components. Replace lost equipment or components and repair damage to new condition, in accordance with manufacturer's instructions.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Design conditions shall be as indicated on the Equipment Schedules.

2.2 MANUFACTURERS

- A. Manufacturers: Provide products of one of the following:
1. The Trane Company.
 2. Modine Manufacturing Company.
 3. Sterling Gas Fired Heating Company.
 4. Or equal.

2.3 DETAILS OF CONSTRUCTION

- A. Gas-Fired Unit Heaters:
1. Casing:
 - a. Heavy-gauge steel.
 - b. Metal surface factory treated to prevent rust with baked enamel finish.
 - c. Built-in adjustable discharge louvers.
 2. Burner:
 - a. Gas-fired.
 - b. Material: Aluminized steel.
 - c. Design: Non-clogging, slotted ports.
 - d. Port protector.
 - e. Burner assembly shall be of unitized construction.
 3. Heat Exchanger:
 - a. Construction:
 - 1) Design: Air-foil contoured tubes.
 - 2) Material: see schedule.
 - 3) Heliarc machine welded.
 - b. Welded construction.
 - c. Indirect fired.
 4. Fan:
 - a. Propeller Type: Statically and dynamically balanced.
 - b. Blower Type: Statically and dynamically balanced.
 5. Motor:
 - a. Single speed.
 - b. Single phase.
 - c. Built-in overload protection.
 - d. Factory-mounted and wired.
 - e. Mounted with vibration isolators.
 - f. Totally enclosed fan cooled.
 6. Efficiency: 80 percent, minimum.
 7. Accessories:
 - a. Factory-wired and mounted.
 - b. High limit switch.
 - c. Ignition transformer and spark ignition controller.
 - d. Unit mounted disconnect switch.
 - e. Safety shutdown, 24 volt gas valve with 100 percent safety pilot shut off.

- f. Manual shut off valve on gas line.
- g. Fan controls.
- h. Pressure regulator.
- i. Leak limiting device.
- j. Approved belt guard.
- 8. Draft diverter shall be integral part of heat exchanger.
 - a. Construction: see schedule.

2.4 CONTROL ACCESSORIES

- A. Space Thermostat:
 - 1. Application: Heating.
 - 2. Sealed Noryl case.
 - 3. Shielded nickel-plated sensing bulb attached directly to thermostat enclosure.
 - 4. Thermostat Setpoint Range: 40°F to 100°F.
 - 5. Adjustable setpoints through dial on face.
 - 6. 120 VAC.
 - 7. Contacts shall have proper ampere rating for intended use.
 - 8. Rating: NEMA 4X.
 - 9. Products and Manufacturers: Provide one of the following:
 - a. Chromalox, Model WCRT-100.
 - b. Or equal.
- B. Explosion-Proof Space Thermostat:
 - 1. UL Listed for Class I, Group D hazardous locations. Explosion-proof construction.
 - 2. Complete with built-in thermometer.
 - 3. 40°F to 100°F Range with 1°F differential.
 - 4. Tamperproof set point locking device.
 - 5. Rating: 120 VAC, 125 VA rating.
 - 6. Products and Manufacturers: Provide one of the following:
 - a. Indeco, Model C251-011.
 - b. Or equal.

2.5 SUPPORTS

- A. Contractor shall provide and install all additional hangers, rods, supports, bolts, nuts, washers, inserts, and appurtenances as required to mount equipment as shown. All hangers, rods, supports, bolts, nuts, washers, inserts, and appurtenances shall be galvanized steel.

2.6 PAINTING

- A. All piping, equipment and accessories shall be painted in accordance with the requirements of Section 09 91 00, Painting.
- B. Do not paint heat exchanger in non-corrosive areas.

- C. All exterior and interior metal surfaces of unit heaters including coils located in corrosive areas shall be factory coated with a four-coat baked phenolic coating system minimum two to three-mils dry film thickness total, of Heresite Series P-413, or equal.

2.7 SOURCE QUALITY CONTROL

- A. Source Quality Control: Equipment shall be completely manufactured and pre-assembled in accordance with Reference Standards. Perform the following tests and inspections at factory before shipment:
 - 1. Tested and inspected for approval as a unit by Underwriter's Laboratories, Inc., UL Label.
 - 2. Factory test equipment to ensure that the entire package has been properly fabricated and assembled, that all the controls function as specified herein and that the equipment meets the specified performance requirements, including manufacturer's data report.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install all items as shown, specified, and as recommended by the manufacturer.
 - 2. Request instructions from Engineer, in writing, when there is a conflict between the manufacturer's recommendations and the Contract Documents.
 - 3. Present conflicts between equipment and structures to Engineer, in writing, who will determine corrective measures to be taken.
 - 4. Do not modify structures to facilitate installation of equipment, unless specifically approved by Engineer.
 - 5. Installation to conform to the requirements of all local and state codes.
 - 6. Install units and cabinets level and plumb.
 - 7. Install units in accordance with details on the approved Shop Drawings.
 - 8. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical damage.

3.2 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Fill all systems and fully test all equipment, valves, dampers, etc. in operation.
 - 2. Check for excessive vibration while all systems are operating.
 - 3. Installed systems and components will not be released to Owner unless all systems have been tested and approved by the Engineer.
- B. Inspection:
 - 1. Examine areas to receive equipment and accessories for:
 - a. Defects that adversely affect execution and quality of the Work.

- b. Deviations beyond allowable tolerances for equipment and accessories.
 - c. Start the Work only when conditions are satisfactory.
- 2. The Engineer reserves the right to reject or authorize replacement of equipment and accessories found to defective, blistered, cracked or deviated from allowable tolerances as described above.

3.3 ADJUSTING AND CLEANING

- A. Adjusting:
 - 1. Adjust all controls for proper settings.
 - 2. While system is operable, balance all equipment, valves, dampers, etc. to achieve design conditions.
 - 3. Set air deflectors for proper air delivery.
 - 4. Check room thermostat and wiring connections to unit heater.
- B. Cleaning:
 - 1. Thoroughly clean all piping, fittings, valves, equipment and accessories prior to installation.
 - 2. Remove all dirt, rust, dust, etc. from piping, equipment and accessories in preparation for painting.
 - 3. Remove and dispose of all debris and waste from the Site resulting from installation.

3.4 MANUFACTURER'S SERVICES

- A. A factory trained representative shall be provided for installation supervision, start-up and test services and operation and maintenance personnel training services. The representative shall make a minimum of (--1--) visits, minimum (--2--) hours on-Site for each visit, to the Site. The first visit shall be for assistance in the installation of equipment. Subsequent visits shall be for checking the completed installation, start-up and training of the system. Manufacturer's representative shall test operate the system in the presence of the Engineer and verify that the equipment conforms to the requirements. Representative shall revisit the Site as often as necessary until all trouble is corrected and the installation is entirely satisfactory.
- B. All costs, including travel, lodging, meals and incidentals, for additional visits shall be at no additional cost to the Owner.

+ + END OF SECTION + +

SECTION 31 05 19

GEOSYNTHETICS FOR EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, and services required to provide and place geosynthetics as shown and specified.
- B. Related Sections:
 - 1. Section 31 23 05, Excavation and Fill.

1.2 REFERENCES

- A. Standards referenced in this Section are listed below:
 - 1. American Society for Testing and Materials, (ASTM).
 - a. ASTM D 1117, Test Methods for Non-Woven Fabrics.
 - b. ASTM D 3776, Test Methods for Mass per Unit Area (Weight) of Woven Fabric.
 - c. ASTM D 5034, Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Geotextile manufacturer shall be a specialist in the manufacture of geotextile cushion fabric, and have produced and successfully installed a minimum of five million square feet.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Product Data:
 - a. Submit geotextile manufacturer's data, specifications, installation instructions and dimensions.
- B. Informational Submittals: Submit the following:
 - 1. Certificates:
 - a. Submit an affidavit certifying that the filter fabric furnished complies with all requirements specified herein.
 - b. No fabric shall be shipped until the affidavit is submitted to the Engineer.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Each roll of geotextile delivered to the Site shall be labeled by the manufacturer identifying the manufacturer's name, product identification, lot number, roll number and roll dimensions.
- B. All rolls and packages shall be inspected by Contractor upon delivery to the Site. Contractor shall notify Engineer if any loss or damage exists to geotextile filter fabric. Replace loss and repair damage to new condition, in accordance with manufacturer's instructions.
- C. Geotextile shall be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions. Geotextile rolls shall be shipped and stored in relatively opaque and watertight wrappings.

PART 2 - PRODUCTS

2.1 GEOTEXTILE FILTER FABRIC

- A. Geotextile shall be a needle punched, nonwoven fabric composed of 100 percent polyester filaments, which are formed into a stable network such that the filaments retain their relative position. The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalizes, and acids. Geotextile shall conform to the following:

<u>Fabric Property</u>	<u>Unit</u>	<u>Test Method</u>	<u>Minimum Value</u>
Weight	oz/yd ²	ASTM D 3776	10.0
Grab Tensile Strength	lb	ASTM D 4632	250
Grab Strength Elongation	%	ASTM D 4632	50
Trapezoid Tear Strength	lb	ASTM D 4533	100
CBR Puncture	lbs	ASTM D 6241	700
Water Flow Rate	gal/min/ft ²	ASTM D 4491	80

- B. Product and Manufacturer: Provide one of the following:
 - 1. US 250NW as manufactured by US Fabrics.
 - 2. Or equal.

2.2 GEOTEXTILE STABILIZATION FABRIC

- A. Stabilization geotextile shall be a woven fabric composed of heavy woven flat tape yarns, which are formed into a woven geotextile. The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalizes, and acids. Stabilization geotextile shall conform to the following:

<u>Minimum Fabric Property</u>	<u>Unit</u>	<u>Test Method</u>	<u>Value</u>
Grab Tensile Strength	lb	ASTM D 4632	375
Grab Strength Elongation	%	ASTM D 4632	15x8
Trapezoid Tear Strength	lb	ASTM D 4533	120
CBR Puncture	lb	ASTM D 6241	1,200
Apparent Opening Size	US Sieve	ASTM D 4751	50
Water Flow Rate	gal/min/ft ²	ASTM D 4491	15

- B. Product and Manufacturer: Provide one of the following:
1. US 350 as manufactured by US Fabrics.
 2. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Contractor shall examine the conditions under which the Work is to be installed and notify the Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

- A. All geotextiles shall be weighted with sandbags or the equivalent when required. Such sandbags shall be installed during placement and shall remain until replaced with cover material or geomembrane.
- B. Contractor shall take any necessary precautions to prevent damage to underlying layers during placement of the geotextile.
- C. During placement of geotextiles, care shall be taken not to entrap in the geotextile stone, excessive dust, or moisture that could damage the geomembrane, generate clogging, or hamper subsequent seaming.
- D. Geotextiles shall not be exposed to precipitation prior to being installed, and shall not be exposed to direct sunlight for more than 15 days.
- E. Geotextiles shall be overlapped 12-inches.

3.3 GEOTEXTILE REPAIR

- A. Any holes or tears in the fabric shall be repaired as follows:
1. On slopes: A fabric patch shall be sewn into place using a double sewn lock stitch (1/4-inch to 3/4-inch apart and no closer than 1-inch from any edge).

Should any tear exceed ten percent of the width of the roll, that roll shall be removed from the slope and replaced.

2. Non-slopes: A fabric patch shall be spot-seamed in place with a minimum of 24-inches of overlap in all directions.

3.4 PLACEMENT OF COVER MATERIALS

- A. Contractor shall place all cover materials in such a manner to ensure the geotextile is not damaged; minimal slippage of the geotextile on underlying layers; and no excess tensile stresses in the geotextile.

+ + END OF SECTION + +

SECTION 31 23 05

EXCAVATION AND FILL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals required to perform all excavating, filling, and grading, and disposing of earth materials as shown, specified, and required for construction of structures, Underground Facilities, roads, and other facilities required to complete the Work.
2. Preparation of subgrade for slabs and pavements is included under this Section.
3. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof.

B. Work Performed By Others:

1. Electrical Contractor will perform excavation and fill for underground ductbanks and related electrical work. .

C. Related Sections:

1. Section 03 00 05, Concrete.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ACI 522R, Pervious Concrete.
2. ANSI/AISC 360, Specification for Structural Steel for Buildings.
3. ASTM C29/C29M, Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate.
4. ASTM C33/C33M, Specification for Concrete Aggregates.
5. ASTM C94/C94M, Specification for Ready-Mixed Concrete.
6. ASTM C138/C138M, Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
7. ASTM C172, Practice for Sampling Freshly Mixed Concrete.
8. ASTM C150/C150M, Specification for Portland Cement.
9. ASTM C595/C595M, Specification for Blended Hydraulic Cements.
10. ASTM C618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
11. ASTM C989, Specification for Slag Cement for Use in Concrete and Mortars.
12. ASTM D422, Test Method for Particle-Size Analysis of Soils.

13. ASTM D448, Classification for Sizes of Aggregate for Road and Bridge Construction.
14. ASTM D698, Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).
15. ASTM D1556, Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
16. ASTM D1557, Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
17. ASTM D2216, Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
18. ASTM D4253, Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
19. ASTM D4254, Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
20. ASTM D4318, Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
21. ASTM D4832, Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
22. ASTM D6023, Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM).
23. ASTM D6103, Test Method for Flow Consistency of Controlled Low Strength Material (CLSM).
24. ASTM D6938, Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
25. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

1.3 TERMINOLOGY

- A. The following words or terms are not defined but, when used in this Section, have the following meaning:
 1. “Subgrade” is the uppermost surface of native soil material unmoved from cuts; the bottom of excavation.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Professional Engineer:
 - a. Engage a registered professional engineer legally qualified to practice in the same jurisdiction as the Site and experienced in providing engineering services of the kind indicated.
 - b. Responsibilities include but are not necessarily limited to:
 - 1) Reviewing system performance and requirements shown or indicated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance and requirements for submittal to Engineer by Contractor.

- 3) Preparing or supervising the preparation of design calculations and related submittals verifying compliance of the system with the requirements of the Contract Documents.
- 4) Signing and sealing all calculations, drawings, and submittals prepared by professional engineer.
- 5) Certifying that:
 - a) it has performed the design of the system in accordance with the performance requirements stated in the Contract Documents, and
 - b) the said design conforms to Laws and Regulations, and to the prevailing standards of practice.
2. Contractor's Testing Laboratory:
 - a. Retain the services of independent testing laboratory to perform testing and determine compliance with the Contract Documents of the materials specified in this Section.
 - b. Do not employ the same laboratory hired by Owner for field quality control testing under the field quality control Article of this Section.
 - c. Testing laboratory shall comply with ASTM E329 and requirements of Section 01 45 29.13, Testing Laboratory Services Furnished by Contractor.
 - d. Testing laboratory shall be experienced in the types of testing required.
 - e. Selection of testing laboratory is subject to Engineer's acceptance.
- B. Quality Assurance Testing:
 1. Quality assurance testing is in addition to field quality control testing required under Part 3 of this Section.
 2. Materials used in the Work may require testing and retesting, as directed by Engineer, during the Project. Allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be performed at Owner's expense, including retesting of rejected materials and installed Work, shall be performed at Contractor's expense.
 3. Contractor's Testing Laboratory Scope:
 - a. Collect samples and perform testing of proposed fill materials in the laboratory and in the field to demonstrate compliance of the Work with the Contract Documents.
 - b. Testing laboratory shall perform testing required to obtain data for selecting moisture content for placing and compacting fill materials.
 - c. Design controlled low-strength material (CLSM) mixes in accordance with requirements of CLSM Article in Part 2 of this Section. Perform concrete materials evaluation tests and testing of CLSM mixes.
 - d. Submit to Engineer and Contractor written report results of each test.
 4. Required Quality Assurance Material Testing by Contractor's Testing Laboratory:
 - a. Gradation in accordance with ASTM D422. Perform one test for every 1,000 cubic yards of each of the following types of material incorporated into the Work: select fill, general fill, subbase material, drainage fill, and pipe bedding material.

- b. Atterberg limits in accordance with ASTM D4318. Perform one test for every 1,000 cubic yards of the following types of materials incorporated into the Work: general fill, and pipe bedding material.
- c. Moisture/density relations in accordance with ASTM D698, ASTM D1557, ASTM D4253, or ASTM D4254, as applicable. Perform one test for every 5,000 cubic yards of the following types of materials incorporated into the Work: select fill, general fill, subbase material, drainage fill, and pipe bedding material.
- d. Moisture content of stockpiled or borrow material in accordance with ASTM D2216. Perform one test for every 1,000 cubic yards of the following types of material incorporated into the Work: select fill, general fill, subbase material, drainage fill, and pipe bedding material.
- e. CLSM Mix: Verify CLSM mix design by laboratory trial batch, unless indicated otherwise. Perform the following testing on each concrete mix trial batch:
 - 1) Aggregate gradation.
 - 2) Flowability, in accordance with ASTM D6103.
 - 3) Air content, in accordance with ASTM D6023.
 - 4) Unconfined compressive strength of CLSM mixes at 90 days, in accordance with ASTM D4832.
 - 5) Submit for each concrete mix trial batch the following information:
 - a) Project identification name and number (if applicable).
 - b) Date of test report.
 - c) Complete identification of aggregate source of supply.
 - d) Tests of aggregates for compliance with the Contract Documents.
 - e) Brand, type, and composition of cementitious materials.
 - f) Brand, type, and quantity of each admixture.
 - g) Quantity of water used in trial mixes.
 - h) Proportions of each material per cubic yard.
 - i) Gross weight and yield per cubic yard of trial mixtures.
 - j) Measured flowability.
 - k) Measured air content.
 - l) Unconfined compressive strength.
- f. Requirement for trial batch may be waived by Engineer if sufficient field test data documenting compliance with specified material properties and performance properties is submitted to and accepted by Engineer. Tests shall have been made on concrete with identical mix design to mix design proposed for the Work, including sources of aggregate and manufacturers of cementitious materials and admixtures.

C. Regulatory Requirements:

- 1. Perform excavation work in compliance with requirements of authorities having jurisdiction and Laws and Regulations, including:
 - a. OSHA, 29 CFR Part 1926, Section .650 (Subpart P – Excavations).
- 2. Obtain required permits and approvals for excavation and fill Work, including work permits from right-of-way owners and permits from

environmental authorities having jurisdiction over discharge of water from excavations.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. List of CLSM materials and mix designs proposed for use. Include results of quality assurance testing performed to qualify the materials and to establish the mix designs.
 - b. Laboratory Trial Batch Reports: Submit laboratory quality assurance test reports for materials and mix design tests.
 - c. Modifications to the Work proposed due to design of sheeting, shoring, bracing, cofferdams, and similar excavation supports.
2. Product Data:
 - a. Manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures to be used in pervious concrete mixes and CLSM mixes.
3. Samples:
 - a. Submit Sample of each aggregate and soil material required under this Section. Deliver Samples to Resident Project Representative. Samples shall be of sufficient size to demonstrate the array of gradation and material types expected in the Work.

B. Informational Submittals: Submit the following:

1. Procedure Submittals:
 - a. Excavation Plan: Prior to starting excavation operations, submit written plan to demonstrate compliance with OSHA 29 CFR Part 1926.650. As a minimum, excavation plan shall include:
 - 1) Name of Contractor's "competent person" in responsible charge of excavation and fill Work.
 - 2) Excavation method(s) and additional items to be included in the Work, as listed in Paragraph 1.5.B.2.a of this Section.
 - 3) Copies of "manufacturer's data" or other tabulated data if protective system(s) are designed on the basis of such data.
 - 4) Copies of required permits and approvals, from authorities having jurisdiction and affected utility owners, for excavation methods proposed.
 - b. Proposed compaction procedure and compaction equipment proposed for use. Where different procedures or equipment will be used for compacting different types of material or at different locations at the Site, indicate where each procedure and equipment item will be used.
2. Excavation Support Plan and Related Information Prepared by Contractor's Professional Engineer:
 - a. Contractor and Contractor's professional engineer shall prepare the following for submittal:
 - 1) Sheeting and bracing, or other protective system(s) required.
 - 2) Dewatering system.

- 3) Cofferdams.
 - 4) Underpinning.
- b. Drawings and calculations shall be prepared by professional engineer qualified in the specialty involved. Engineer's review and acceptance of submittal does not imply approval by Engineer of the associated Work. Contractor shall be solely responsible for designing, installing, operating and maintaining the system(s) required to satisfactorily perform all necessary sheeting, bracing, protection, underpinning, and dewatering.
- 3. Delivery Tickets:
 - a. Copies of delivery tickets for each load of CLSM material delivered to or mixed at the Site. Each delivery ticket shall contain information in accordance with ASTM C94/C94M along with project and contract name and number, date, mix type, mix time, quantity and amount of water introduced.
 - b. Copy of delivery ticket for each load of aggregate and borrow material delivered to the Site. Each delivery ticket shall indicate project and contract by name and number, date, material type, department of transportation item number when applicable, and quantity delivered.
- 4. Quality Assurance Test Results Submittals:
 - a. Submit results of quality assurance testing performed by in accordance with Paragraph 1.4.B of this Section, unless included as part of another submittal under this Section. Submit results for the following quality assurance testing:
 - 1) Tests on borrow fill material.
 - 2) Optimum moisture – maximum dry density curve for each type of fill material.
- 5. Field Quality Control Submittals:
 - a. Submit results of testing and inspection performed in accordance with the field quality control Article in Part 3 of this Section, including:
 - 1) Field density testing.
 - 2) Tests of actual unconfined compressive strength or bearing tests of each stratum.
- 6. Qualifications Statements:
 - a. Professional engineer.
 - b. Quality Assurance Testing laboratory. Submit name and qualifications of testing laboratory to be employed, and qualifications of testing laboratory's personnel that will perform quality assurance testing required in this Section.
 - c. Field Quality Control Testing Laboratory: Names and qualifications of testing laboratory employed, and qualifications of testing laboratory's personnel that will perform field quality control testing as required under this Section.

1.6 SITE CONDITIONS

- A. Subsurface Information: The Supplementary Conditions indicate information available relative to subsurface conditions at the Site. Such information and data

is not intended as a representation or warranty of continuity of conditions between soil borings or test pits, nor of groundwater levels at dates and times other than date and time when measured, nor that purpose of obtaining the information and data were appropriate for use by Contractor. Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor.

- B. Soil borings and other exploratory operations may be made by Contractor, at no additional cost to Owner. Coordinate Contractor-performed test borings and other exploratory operations with Owner and utility owners as appropriate. Perform such explorations without disrupting or otherwise adversely affecting operations of Owner or utility owners. Comply with Laws and Regulations relative to required notifications.
- C. Existing Structures:
 - 1. The Contract Documents show or indicate certain structures and Underground Facilities adjacent to the Work. Such information was obtained from existing records and is not guaranteed to be correct or complete. Contractor shall explore ahead of the excavation to determine the exact location of all existing structures and Underground Facilities. Existing structures and Underground Facilities shall be supported and protected from damage by Contractor. Immediately repair and restore existing structures and Underground Facilities damaged by Contractor without additional cost to Owner.
 - 2. Movement or operation of construction equipment over Underground Facilities shall be at Contractor's sole risk and only after Contractor has prepared and submitted to Engineer and utility owners (as applicable), and received acceptance therefrom, a plan describing Contractor's analysis of the loads to be imparted and Contractor's proposed measures to protect structures and Underground Facilities during the Project.
 - 3. Coordinate with utility owners for shut-off of services in active piping and conduits. When required by utility owner, Owner will assist Contractor with utility owner notifications. Completely remove buried piping and conduits indicated for removal and not otherwise indicated as being abandoned or to remain in place.
 - 4. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when such interruption is indicated in the Contract Documents or when allowed in writing by Engineer after acceptable temporary utility services are provided by Contractor for the affected structure or property.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Select Fill:

1. Material shall be well-graded, crushed aggregate, free of organic material. Material shall be Item 733-10 in accordance with New York State Department of Transportation.
- B. General Fill:
1. Material shall be free of: rock and gravel larger than three inches in any dimension, debris, waste, frozen materials, organic material, and other deleterious matter.
 2. Fill shall have a liquid limit not greater than 45, and plasticity index not greater than 25.
 3. Previously-excavated materials complying with the Contract Documents requirements for general fill may be used for general fill.
 4. When on-Site materials are found unsuitable for use as general fill, provide select fill or approved off-Site general fill materials. Prior to using off-Site material as general fill, furnish submittal for and obtain Engineer's approval of the material proposed for use.
- C. Subbase Material:
1. Material shall be naturally- or artificially-graded mixture of natural or crushed gravel, crushed stone, or natural or crushed sand. Crushed slag is unacceptable. Material shall be Item 304, Type 4 in accordance with New York State Department of Transportation.
 2. Crushed Recycled Concrete Subbase Material:
 - a. Contractor may use crushed recycled concrete material as subbase material.
 - b. Recycled concrete material shall be crushed and screened and shall comply with subbase gradation requirements of this Section. Before using in the Work, remove existing reinforcing steel from recycled concrete material.
 - c. Crushed recycled concrete material shall not contain chloride ions or aggregates susceptible to alkali-silica reaction.
 - d. The pH of recycled concrete material shall not exceed 11.
- D. Drainage Fill:
1. Material shall be washed, uniformly-graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing 1.5-inch sieve and not more than five percent passing a No. 4 sieve.
- E. Pipe Bedding Material:
1. Aggregate material shall be crushed stone and gravel, free of: rock or gravel larger than 1/2-inch in any dimension, debris, waste, frozen materials, organic material and other deleterious matter. Material shall be Item 703-4, Size 1 in accordance with New York State Department of Transportation.
 2. Sand material, where required, shall consist of natural or manufactured granular material and shall contain no organic material. Sand shall be non-plastic, when tested in accordance with ASTM D4318, 100 percent shall pass a 1/2-inch screen and not more than five percent shall pass a No. 200 screen.

- F. Mudmat:
1. Mudmat shall be in accordance with Section 03 30 05, Concrete.
- G. Controlled Low Strength Material (CLSM):
1. CLSM shall be self-leveling and self-compacting cementitious material.
 - a. Cement: Type I or Type II portland cement complying with ASTM C150/C150M.
 - b. Fly Ash Mineral Admixture: Comply with ASTM C618, Class F.
 - c. Water: Clean, potable.
 - d. Admixtures: Provide admixtures in accordance with product manufacturer's published instructions. Admixtures shall be compatible with each other. Do not use calcium chloride or admixtures containing chloride ions. Use only admixtures that have been tested and approved in the mix designs.
 - e. Fine Aggregates: ASTM C33/C33M.
 2. CLSM Mix:
 - a. Cement Content: 50 pounds per cubic yard.
 - b. Fly Ash Mineral Admixture: 250 pounds per cubic yard.
 - c. Fine Aggregate Content: 2910 pounds per cubic yard.
 - d. Water Content: 500 pounds per cubic yard.
 - e. Admixtures shall comply with manufacturer's recommendations for use with CLSM.
 - f. Unconfined compressive strength shall be not more than 100 psi.
 - g. Adjustment of Mixes.
 - 1) Mix design adjustments may be requested by Contractor when warranted by characteristics of materials, Site conditions, weather, test results, or other, similar circumstances.
 - 2) Submit for Engineer's approval laboratory test data for adjusted mix designs, including compressive strength test results.
 - 3) Implement adjusted mix designs only after Engineer's approval.
 - 4) Adjustments to mix designs shall not result in additional costs to Owner.

2.2 SOURCE QUALITY CONTROL

- A. Perform quality assurance testing, and submit results to Engineer, in accordance with the "Quality Assurance" Article in Part 1 of this Section.
- B. Owner's testing laboratory will perform quality assurance testing, and submit results to Engineer and Contractor, in accordance with the "Quality Assurance" Article in Part 1 of this Section.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Provide Engineer with sufficient notice and with means to examine areas and conditions under which excavating, filling, and grading will be performed. Engineer will advise Contractor in writing when Engineer is aware of conditions that may be detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 TEST PITS

A. General:

- 1. In advance of the construction, excavate, make observations and measurements, and fill test pits to determine conditions or location of the existing Underground Facilities and structures. Perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, filling, and replacing pavement for test pits. Contractor shall be responsible for the definite location of each existing Underground Facility involved within the area of excavation for the Work. Exercise care during such location work to avoid damaging and disrupting the affected Underground Facility or structure. Contractor shall be responsible for repairing, at his expense, damage to Underground Facility or structure caused during the Work.

B. Payment for Test Pits:

- 1. All payment for test pits shown or indicated in the Contract Documents will be part of the lump sum Contract Price.
- 2. Payment for test pits required by Engineer and not shown or indicated in the Contract Documents will be paid as Unit Price Work.
- 3. Separate payment will not be made for test pits made by Contractor for Contractor's own use.

3.3 PREPARATION

A. Site Preparation:

- 1. Clear areas to be occupied by permanent construction of all trees, brush, roots, stumps, logs, wood and other materials and debris. Clean and strip vegetation, sod, topsoil, and organic matter from subgrades where fills will be placed, and from areas where structures will be constructed. Remove from the Site and properly dispose of all waste materials.
- 2. Burning is not allowed at the Site.

B. Use of Explosives:

- 1. Use of explosives is not allowed.

C. Dust Control:

- 1. Control objectionable dust caused by Contractor's operation of vehicles and equipment, clearing, and other actions. To minimize airborne dust, apply water or use other methods subject to Engineer's acceptance and approval of authorities having jurisdiction.

D. Maintenance and Protection of Traffic:

1. Keep all streets and traffic ways open for passage of traffic and pedestrians during the Project, unless otherwise approved by owner of the street, traffic way, or right-of-way, as applicable. Construction traffic shall access the Site only via entrance(s) indicated in Section 01 55 13, Access Roads and Parking Areas.
2. When required to cross, obstruct, or temporarily close a street or traffic way, provide and maintain suitable bridges, detours, and other acceptable temporary expedients to accommodate traffic. Closings of street or traffic way shall be for shortest time practical, and passage shall be restored immediately after completion of fill and temporary paving or bridging.
3. Give required advance notice to fire department, police department, and other emergency services as applicable of proposed construction operations.
4. Give reasonable notice to owners or tenants of private property who may be affected by construction operations. Give such notice not less than five days prior to construction that will affect the property.
5. Hydrants, valves, fire alarm boxes, postal boxes and delivery service boxes, and other facilities that may require access during construction shall be kept accessible for use.
6. Provide temporary signage, signals, barricades, flares, lights and other equipment, service, and personnel required to regulate and protect traffic and warn of hazards. Such Work shall comply with requirements of owner of right-of-way and authorities having jurisdiction at the Site. Remove temporary equipment and facilities when no longer required, and restore grounds to original or to specified conditions, as applicable.

3.4 DEWATERING

A. Dewatering – General:

1. Provide and maintain adequate drainage and dewatering equipment to remove and dispose of all surface water and ground water entering excavations, or other parts of the Work and work areas. Keep each excavation dry during excavation, subgrade preparation, and continually thereafter until the structure to be built therein is acceptable to Engineer and backfilling operations are completed and acceptable to Engineer.
2. Keep all working areas at the Site free of surface water at all times. Provide temporary drainage ditches and temporary dikes, and provide required temporary pumping and other work necessary for diverting or removing rainfall and all other accumulations of surface water from excavations and fill areas. Perform diversion and removal of surface water in manner that prevents accumulation of water behind permanent or temporary structures and at any other locations in the construction area where such accumulations may be detrimental.
3. Water used for working or processing, resulting from dewatering operations, or containing oils or sediments that will reduce the quality of the surface water or groundwater downstream of the point of discharge, shall not be directly discharged. Divert such waters through temporary settling basin or filter before discharging to surface water, groundwater, or drainage routes.

4. Contractor shall be responsible for condition of piping, conduits, and channels used for drainage and such piping, conduits, and channels shall be clean and free of sediment.
5. Remove water from excavations as fast as water collects.

B. Temporary Dewatering System:

1. Contractor shall design, provide, and operate dewatering system to include sufficient trenches, sumps, pumps, hose, piping, well points, deep wells, and similar facilities, necessary to depress and maintain groundwater level 12 inches below the base of each excavation during all stages of construction operations.
2. Design and operate dewatering system to avoid settlement and damage to existing structures and Underground Facilities.
3. Groundwater table shall be lowered in advance of excavation for a sufficient period of time to allow dewatering of fine grain soils.
4. Maintain groundwater level at excavations two feet below lowest subgrade excavation until the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural groundwater.
5. Operate dewatering system continuously, 24 hours per day, seven days per week. Provide standby pumping facilities and personnel to maintain the continued effectiveness of the system. Do not discontinue dewatering operations without first obtaining Engineer's acceptance for such discontinuation.
6. If, in Engineer's opinion, the water levels are not being lowered or maintained as required, provide additional or alternate temporary dewatering devices as necessary, at no additional cost to Owner.
7. Locate elements of temporary dewatering system to allow continuous dewatering operation without interfering with the Work to the extent practicable.
8. Where portions of dewatering system are located in the area of permanent construction, submit to and obtain Engineer's acceptance of details of proposed methods of constructing the Work at such location. Control of ground water shall continue until the permanent construction provides sufficient dead load to withstand hydrostatic uplift of the normal groundwater, until concrete has attained sufficient strength to withstand earth and hydrostatic loads, and until waterproofing Work is completed.
9. Perform pumping of water from excavations in a manner that prevents carrying away of unsolidified concrete materials, and that avoids damaging the subgrade.
10. Before discontinuing dewatering operations or permanently allowing rise of groundwater level, prepare computations to demonstrate that structures affected by the water level rise are protected by fill or other means to sustain uplift. Use a safety factor of 1.25 when preparing such calculations.

C. Disposal of Water Removed by Dewatering System:

1. Contractor's dewatering system shall discharge to a suitable location acceptable to OWNER, in accordance with Laws and Regulations.

2. Convey water from excavations in closed conduits. Do not use trench excavations as temporary drainage ditches.
3. Dispose of water removed from excavations in a manner that does not endanger health and safety, property, the Work, and other portions of the Project.
4. Dispose of water in manner that causes no inconvenience to Owner, others involved in the Project, and adjacent and downstream properties.

3.5 EXCAVATION

- A. Perform all excavation required to complete the Work as shown, specified, and required. Excavations shall include removing and handling of earth, sand, clay, gravel, hardpan, soft, weathered or decomposed rock, pavements, rubbish, and other materials within the excavation limits. Where the excavation includes rock that requires drilling, or specialized equipment for removal, remove rock in accordance without blasting.
- B. Excavation Protection:
 1. Provide excavation protection system(s) in accordance with Laws and Regulations to prevent injury to persons and property, including Underground Facilities.
 2. Excavation Less Than Five Feet Deep: Excavations in stable rock or in soil conditions where there is no potential for a cave-in may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded, or shored and braced.
 3. Excavations Greater Than Five Feet Deep: Excavations in stable rock may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded, or shored and braced.
 4. Provide and maintain excavation protection system(s) in accordance with submittals accepted by Engineer and required under Paragraph 1.5.B of this Section.
- C. Maintain excavations in dry condition in accordance with “Dewatering” Article in Part 3 of this Section.
- D. Elevation of bottom of footings shown is approximate. Engineer may direct such minor changes in dimensions and elevations as may be required to secure a satisfactory footing.
- E. When excavations are made below required grades without written order of Engineer, fill such excavations with compacted select fill material, as directed by Engineer, at Contractor’s expense.
- F. Extend excavations sufficiently on each side of structures, footings, and similar construction to allow setting of forms, installation of shoring and bracing, and the safe sloping of banks, as necessary.
- G. Subgrades – General:

1. Subgrades shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud, muck, and other soft or unsuitable materials; and shall remain firm and intact under all construction operations. Subgrades that are otherwise solid but become soft or mucky on top due to construction operations shall be reinforced with (---). Finished elevation of stabilized subgrades shall not be above subgrade elevations shown.
2. If, in Engineer's opinion, subgrade becomes softened or mucky because of construction delays, failure to dewater properly, or other cause within Contractor's control, subgrade shall be excavated to firm material, trimmed, and backfilled with select fill material at Contractor's expense.

H. Proofrolling Subgrades:

1. Prior to placing fill or constructing pavements or slabs, proofroll the subgrade surface with sufficient proofrolling apparatus. Before starting proofrolling, submit to and obtain acceptance from Engineer of proof rolling apparatus and procedure to be used.
2. Proofrolling operations shall be made in the presence of Engineer. Notify Engineer at least 24 hours in advance of start of proofrolling operations.
3. Subgrades displaying pronounced elasticity or deformation, deflection, cracking, or rutting shall be stabilized as directed by Engineer. Unsuitable materials shall be undercut to the depth directed by Engineer and replaced with select fill material. Other suitable stabilization methods may be directed by Engineer.

I. Pipe Trench Preparation:

1. Not more than 150 feet of trench may be opened in advance of installing pipe in trench.
2. Trench width shall be minimized to greatest extent practical, and shall comply with the following:
 - a. Trench width shall be sufficient to provide space for installing, jointing and inspecting piping. Refer to Drawings for trench requirements. In no case should trench be wider at top of pipe than pipe barrel OD plus two feet, unless otherwise shown or indicated.
 - b. Enlargement of trench width at pipe joints may be made when required and approved by Engineer.
 - c. Trench width shall be sufficient for shoring and bracing, or shielding and dewatering.
 - d. Trench width shall be sufficient to allow thorough compaction of fill adjacent to bottom half of pipe.
 - e. Do not use excavating equipment that requires the trench to be excavated to excessive width.
3. Depth of trench shall be as shown or indicated. If required and approved by Engineer in writing, depths may be revised.
4. Where Engineer considers existing material beneath bedding material unsuitable, remove and replace such unsuitable material with select fill material.

J. Excavated Materials to be Used as Fill:

1. Stockpile excavated materials that are acceptable for use as fill.
2. As excavation proceeds, keep stockpiles of excavated materials suitable for use as fill separate from unsuitable materials and waste materials.
3. Place, grade, and shape stockpiles for proper drainage.
4. Locate and retain soil materials away from edge of excavations.
5. Dispose of excess soil material and waste materials as specified in this Section.
6. Stockpiled excavated soils for use as select fill or general fill shall be tested and classified by laboratory as on-Site select fill or on-Site general fill. Perform required quality assurance testing for material verification on stockpiled materials as soon as possible to demonstrate compliance of excavated materials with the Contract Documents.

3.6 UNAUTHORIZED EXCAVATION

- A. All excavations outside lines and grades shown or indicated and that are not approved by Engineer, together with removing and disposing of the associated material, shall be at Contractor's expense. Fill unauthorized excavations with properly-compacted select fill material at Contractor's expense.

3.7 EROSION AND SEDIMENT CONTROLS

- A. Provide temporary erosion and sediment controls in accordance with Section 01 57 05, Temporary Controls. When applicable, also comply with requirements of the erosion and sediment control plan approved by authorities having jurisdiction.

3.8 SHEETING, SHORING, AND BRACING

- A. General:
 1. Design and provide sheeting, shoring, bracing, cofferdams, and similar excavation supports as shown, specified, and required for the Work.
 2. Clearances and types of temporary sheeting, shoring, bracing, and similar excavation supports, insofar as they may affect the finished character of the Work and the design of sheeting to be left in place, will be subject to the Engineer's approval; but Contractor is responsible for adequacy of all sheeting, shoring, bracing, cofferdams, and similar excavation supports.
 3. Materials:
 - a. Previously-used materials shall be in good condition, and shall not be damaged or excessively pitted. All steel or wood sheeting designated to remain in place shall be new. New or used sheeting may be used for temporary sheeting, shoring, and bracing.
 - b. All steel work for sheeting, shoring, bracing, cofferdams and other excavation supports, shall be in accordance with ANSI/AISC 360, except that field welding will be allowed.
 4. As excavation progresses, carry down shoring, bracing, cofferdams, and similar excavation supports to required elevation at bottom of excavation.

5. Comply with Laws and Regulations regarding sheeting, shoring, bracing, cofferdams, and similar excavation supports.
 6. Maintain sheeting, shoring, bracing, and other excavation supports in excavations regardless of time period excavations will be open.
 7. Unless otherwise shown, specified, or directed, remove materials used for temporary construction when the Work is completed. Perform such removal in manner not injurious to the structures and Underground Facility, their appearance, and adjacent construction.
- B. Removal of Sheeting and Bracing:
1. Remove sheeting and bracing from excavations, unless otherwise directed by Engineer in writing. Perform removal to avoid damaging the Work and adjacent construction. Removal shall be equal on both sides of excavation to ensure no unequal loads on structures and Underground Facilities.
 2. Defer removal of sheeting and bracing, where removal may cause soil to come into contact with concrete, until the following conditions are satisfied:
 - a. Concrete has cured for not less than seven days.
 - b. Wall and floor framing, up to and including grade level floors, is in place.

3.9 TRENCH SHIELDS

- A. Excavation of earth material below bottom of trench shield shall not exceed the limits established in Laws and Regulations.
- B. When using a shield for installing piping:
1. Portions of trench shield extending below the mid-diameter of an installed, rigid pipe, such as prestressed concrete pipe and other types of rigid pipe, shall be raised above the pipe's mid-diameter elevation prior to moving the shield along the trench for further construction.
 2. Bottom of shield shall not at any time extend below mid-diameter of installed pipe that is flexible or has flexing capability, such as steel, ductile iron, PVC, CPVC, polyethylene, and other pipe that has flexing capability.
- C. When using a shield for installing structures, bottom of the shield shall not extend below the top of the bedding for the structures.
- D. When removing the shield or moving the shield ahead, exercise extreme care to prevent moving piping, structures, and other Underground Facilities, and prevent disturbance of bedding material for piping, structures, and other Underground Facilities. When piping, structures, or Underground Facilities are disturbed, remove and reinstall the disturbed items in accordance with the Contract Documents.

3.10 FILL AND COMPACTION – GENERAL PROVISIONS

- A. Provide and compact all fill required for the finished grades as shown and as specified in this Section.

- B. Place fill in excavations as promptly as progress of the Work allows, but not until completing the following:
1. Engineer's authorization after observation of construction below finish grade, including dampproofing, waterproofing, perimeter insulation, and similar Work.
 2. Inspection, testing, approval, and recording of locations of Underground Facilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and filling of voids with satisfactory materials.
 5. Removal of trash and debris.
 6. Permanent or temporary horizontal bracing is in place on horizontally-supported walls.
- C. Fill that includes organic materials or other unacceptable material shall be removed and replaced with approved fill material in accordance with the Contract Documents.
- D. Placement – General:
1. Place fill to the grades shown or indicated. Bring up evenly on all sides fill around structures and Underground Facilities.
 2. Fill areas shall be undercut and proof-rolled as directed by Engineer.
 3. Place fill materials at moisture content and density as specified in Table 31 23 05-A of this Section and this Article's requirements on compaction density. Furnish and use equipment capable of adding measured amounts of water to the fill materials to bring fill materials to a condition within required moisture content range. Furnish and use equipment capable of discing, aerating, and mixing the fill materials to ensure reasonable uniformity of moisture content throughout the fill materials, and to reduce moisture content of borrow materials by air drying, when necessary. When subgrade or lift of fill materials requires moisture-conditioning before compaction, fill material shall be sufficiently mixed or worked on the subgrade to ensure uniform moisture content throughout the lift of material to be compacted. Materials at moisture content in excess of specified limit shall be dried by aeration or stockpiled for drying.
 4. Perform compaction with equipment suitable for the type of fill material placed. Select and use equipment capable of providing the minimum density required in the Contract Documents. Use light compaction equipment, with equipment gross weight not exceeding 7,000 pounds within horizontal distance of ten feet from the wall of completed, below-grade structures. Furnish and use equipment capable of compacting in restricted areas next to structures and around piping and Underground Facilities. Effectiveness of the equipment selected by Contractor shall be tested at start of compacted fill Work by constructing a small section of fill within the area where fill will be placed. If tests on the test section of fill indicate that required compaction is not obtained, do one or more of the following:

increase the amount of coverages, decrease the lift thicknesses, or use different compactor equipment.

5. Place fill materials in horizontal, loose lifts, not exceeding specified uncompacted thickness. Place fill in a manner ensuring uniform lift thickness after placing. Mechanically compact each lift, by not less than two complete coverages of the compactor. One coverage is defined as the conditions reached when all portions of the fill lift have been subjected to the direct contact of compactor's compacting surface. Compaction of fill materials by inundation with water is unacceptable.
6. Do not place fill materials when standing water is present on surface of the area where fill will be placed. Do not compact fill when standing water is present on the fill to be compacted. Do not place or compact fill in a frozen condition or on top of frozen material. Fill containing organic materials or other unacceptable material previously described shall be removed and replaced prior to compaction.
 7. If required densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly-functioning compaction equipment, Contractor shall perform all work required to provide the required densities. Such work shall include, at no additional cost to Owner, complete removal of unacceptable fill areas and replacement and re-compaction until acceptable fill is provided.
8. Repair, at Contractor's expense, observed or measured settlement. Make repairs and replacements as required within 30 days after being so advised by Engineer.

E. Fill Against Concrete:

1. Placing fill against concrete below finished grade is not allowed until the concrete has attained its specified strength, as determined by duration of concrete curing and testing of field-cured concrete cylinders. Requirements for strength and curing time are in Section 03 30 00, Cast-in-Place Concrete.
2. Elevation of fill placed against concrete walls shall not differ by more than two feet on each side of walls, unless walls are adequately braced or all floor framing is in place up to and including grade level slabs.
3. Backfill structural foundation units as soon as practicable, in accordance with this Section, after concrete has gained sufficient strength to avoid damage, to avoid ponding of surface water and accumulation of debris.
4. Where fill is placed against waterproofed surface, exercise care that waterproofing material is not damaged.

F. Fill in Electrical Ductbank Trenches:

1. Provide general fill for full depth of electrical ductbank trench, below and above electrical ductbank. Where one ductbank passes beneath another pipe or ductbank, provide select fill to the elevation of the bottom of upper ductbank or pipe, as applicable.
2. Placing and compacting fill in electrical ductbank trenches shall comply with requirements of Paragraph "G. Fill in Pipe Trenches", of this Article.

G. Fill in Pipe Trenches:

1. Place pipe bedding material in pipe trenches in horizontal layers, and thoroughly compact each layer before the next layer is placed.
2. Piping Installed in Fills Above Pre-construction Grade:
 - a. Prior to installing piping, place the fill in accordance with the Contract Documents until the fill reaches a minimum elevation two feet higher than the top of piping to be installed. Excavate the trench; install the piping, and backfill. Subsequently provide the remainder of the fill required for the Work.
3. Piping trenches may be backfilled prior to testing of piping, unless nature of the test requires observation of pipe during testing. Do not construct building or structure over piping until piping has been successfully tested and passed.
4. Pipe Bedding: Pipe bedding material shall be as follows:
 - a. Install PVC, CPVC, HDPE, and FRP piping on a layer of sand. Sand shall extend to 12 inches above top of pipe and to the trenchwalls on each side of the pipe.
 - b. Unless otherwise shown, install other types of piping on not less than six-inch layer of aggregate pipe bedding material. Aggregate pipe bedding material shall extend 12 inches above top of the pipe.
5. Placing and Compacting Pipe Trench Fill: Unless otherwise shown, placement and compaction of pipe trench fill materials shall comply with the following:
 - a. Pipe bedding material shall be spread and the surface graded to provide a uniform and continuous support beneath piping at all points between bell holes or pipe joints. Slight disturbance of installed pipe bedding material surface during withdrawal of pipe slings or other lifting tackle is acceptable.
 - b. After each pipe's bedding material has been graded, and the piping has been aligned, joined in accordance with the Contract Documents, and placed in final position on bedding material, provide and compact sufficient pipe trench fill material under and around each side of the pipe and back of the bell or end thereof to hold piping in proper position and maintain alignment during subsequent pipe jointing and embedment operations. Deposit and compact pipe trench fill material uniformly and simultaneously on each side of piping to prevent lateral displacement of piping. Place and compact pipe trench fill material to an elevation 12 inches above top of pipe, unless otherwise shown or specified.
 - c. Each layer of pipe trench fill material shall be compacted by at least two complete coverages of all portions of surface of each lift using appropriate compaction equipment.
 - d. Method of compaction and compaction equipment used shall be appropriate for material to be compacted and shall not transmit damaging shocks to the piping.

H. Temporary Pavement:

1. Place 1.5 inches of temporary asphalt concrete pavement immediately after filling excavations in paved roadways and other paved areas that will remain for permanent use.
 2. Maintain surface of paved area over the fill in good and safe condition during progress of the Work, and promptly fill depressions over and adjacent to the fill area caused by settlement of fill.
 3. Permanent replacement pavement shall be equal to that of the existing roadways, unless otherwise shown or specified.
- I. Subbase Placement:
1. Provide subbase material where shown to the limits shown or indicated.
 2. Place subbase material in compacted lifts not exceeding depth of six inches each.
- J. Drainage Fill Placement:
1. Provide drainage fill material where shown to the limits shown or indicated.
 2. Place drainage fill material in compacted layers of uniform thickness not exceeding depth of six inches each. Compact lifts of drainage fill using suitable compaction equipment.
- K. Compaction Density Requirements:
1. Compaction required for all types of fills shall be in accordance with Table 31 23 05-A of this Section. Moisten material or aerate the material as necessary to provide the moisture content that will facilitate obtaining the required compaction.

**TABLE 31 23 05-A
REQUIRED MINIMUM DENSITY**

Material	Percent Compaction (ASTM D698)	Uncompacted Lift (inches)
General Fill		
More than five feet below final grade	100	8
Less than five feet below final grade	95	8
Select Fill		
Below concrete slabs or mats	100	8
Below pavement and sidewalks	100	12
Behind concrete walls	95	8
Subbase Material		
Below pavement and sidewalks	100	12
All other locations	100	8
Pipe Bedding Material		
Below structures or pavement	100	8
All other locations	95	6
Drainage Fill	N/A	6

2. Fill shall be wetted and thoroughly mixed to achieve optimum moisture content plus-or-minus three percent, with the following exceptions:
 - a. On-site clayey soils: Optimum to plus three percent.
 3. Replace natural, undisturbed soils or compacted soil subsequently disturbed or removed by construction operations with materials compacted as indicated in Table 31 23 05-A of this Section.
 4. Field quality control testing for density; to verify that specified density was obtained, will be performed during each day of compaction Work. Responsibility for field quality control testing is specified in the "Field Quality Control" Article in Part 3 of this Section.
 5. When field quality control testing indicates unsatisfactory compaction, provide additional compaction necessary to obtain the specified compaction. Perform additional compaction Work at no additional cost to Owner until specified compaction is obtained. Such work includes complete removal of unacceptable (as determined by Engineer) fill areas and replacement and re-compaction until acceptable fill is provided in accordance with the Contract Documents.
- L. Replacement of Unacceptable Excavated Materials: In cases where over-excavation to replace unacceptable soil materials is required, backfill the excavation to required subgrade with select fill material and thoroughly compact in accordance with Table 31 23 05-A and the associated "Compaction Density Requirements" in this Article. Slope the sides of excavation in accordance with the maximum inclinations specified for each structure location.

3.11 GRADING

- A. General:
1. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas.
 2. Smooth subgrade surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free of irregular surface changes, and shall comply with the following:
1. Grassed Areas or Areas Covered with Gravel, Stone, Wood Chips, or Other Special Cover: Finish areas to receive topsoil or special cover to within not more than one inch above or below the required subgrade elevations.
 2. Sidewalks: Shape surface of areas under sidewalks to line, grade, and cross section, with finish surface not more than one inch above or below the required subgrade elevation.
 3. Pavements: Shape surface of areas under pavement to line, grade, and cross section, with finish surface not more than 1/2-inch above or below the required subgrade elevation.

- C. Grading Surface of Fill Under Concrete Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a ten foot straight edge.
- D. Compaction:
 - 1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.12 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Controlled Low Strength Materials Placement:
 - 1. Discharge CLSM from the mixer by reasonable means into the space to be filled.
 - 2. Bring the fill material uniformly up to the fill line shown or indicated in the Contract Documents.
 - 3. Placement of fill over the CLSM may proceed after a curing period of not less than three days.

3.13 PAVEMENT SUBBASE COURSE

- A. General:
 - 1. Place subbase material, in layers of specified thickness, over ground surface to support pavement base course.
 - 2. After completing filling and grading, shape and compact pavement subgrade to an even, firm foundation in accordance with this Section. Remove unsuitable subgrade materials, including soft materials, boulders, vegetation, and loose stones, and replace with compacted fill material as directed by Engineer.
- B. Grade Control:
 - 1. During construction, maintain lines and grades including crown and cross-slope of subbase course.
- C. Placing of Pavement Subbase Course:
 - 1. Place subbase course material on prepared subgrade in layers of uniform thickness, in accordance with indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placing operations.
 - 2. Compaction and Grade Control: Comply with compaction requirements for excavation and fill in this Section, and the following requirements:
 - a. Compaction with roller shall begin at the sides of the area to be paved and continue toward the center. Continue compaction until there is no movement of the course ahead of the roller.
 - b. After compaction of top lift of pavement subbase, provide and uniformly spread pipe bedding material and screenings compacted, on the surface, and sweep using gang-dragged broom, followed by compaction.

- c. After rolling, check for grade with a line not less than 40 feet in length; depression over 1/2-inch deep shall be filled to satisfaction of Engineer.
3. After completing compaction, other than that necessary for bringing material for the next course, do not haul or drive over the compacted subbase.
4. Do not install pavement subbase in excess of 500 feet in length without compacting to prevent softening of the subgrade.
5. If subgrade material becomes churned up into or mixed with the subbase material, remove the mixed material and replace with clean, compacted subbase material.

3.14 DISPOSAL OF EXCAVATED MATERIALS

- A. General:
 1. Contractor shall haul away material removed from excavations that does not comply with requirements for fill, or is in excess of the quantity required for fill.
 2. Disposal of materials shall be in compliance with Laws and Regulations, at no additional cost to Owner.

3.15 TEMPORARY BARRIERS

- A. Provide temporary barrier surrounding excavations and excavation work areas to provide temporary protection to persons and property. Barrier shall have openings only at vehicular, equipment, and worker access points.
- B. Minimum Material Requirements for Temporary Barriers:
 1. Temporary barrier shall not be less snow fence-type fencing, four feet high.
 2. Fence shall be constructed of vertical hardwood slats measuring not less than 1.5 inches by 1/4-inch interwoven with strands of horizontal wire, or shall be of equivalent plastic construction.
 3. Posts:
 - a. Posts shall be steel, either "U"-, "Y"-, "T"-shaped, or channel section.
 - b. Posts shall have a nominal weight of not less than 1/3-pound per linear foot, exclusive of the anchor.
 - c. Posts shall have tapered anchors weighing not less than 0.67 pounds, each firmly attached by means of welding, riveting or clamping.
 - d. Posts shall have corrugations, knobs, notches, or studs placed and constructed to engage a substantial number of fence line wire in the proper position.
 - e. Provide each post with sufficient quantity of galvanized wire fasteners or clamps, of not less than 0.120-inch diameter, for attaching fence wire to post.

3.16 FIELD QUALITY CONTROL

- A. Site Tests: Owner will employ a testing laboratory to perform field quality control testing.
1. Testing Laboratory Scope:
 - a. Perform field moisture content and density tests to ensure that the specified compaction of fill materials has been obtained.
 - b. Tests of actual unconfined compressive strength or bearing tests on each stratum.
 - c. Report results of each test to Engineer and Contractor.
 2. Required Material Tests:
 - a. Compaction: Comply with ASTM D1556 and ASTM D6938, as applicable.
 3. Authority and Duties of Testing Laboratory:
 - a. Technicians representing the testing laboratory shall inspect the materials in the field, perform testing, and report findings to Engineer and Contractor. When materials furnished or the Work performed does not comply with the Contract Documents, technician will direct attention of Engineer and Contractor to such failure.
 - b. Technician will not act as foreman or perform other duties for Contractor. Work will be checked as it progresses, but failure to detect defective Work or non-complying materials shall not in any way prevent later rejection when defect is discovered, nor shall it obligate Engineer for Substantial Completion or final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release requirements of the Contract Documents, or to approve or accept any portion of the Work.
 4. Responsibilities and Duties of Contractor:
 - a. Use of testing laboratory shall in no way relieve Contractor of the responsibility to provide materials and Work in full compliance with the Contract Documents.
 - b. To facilitate testing laboratory, Contractor shall advise testing laboratory at least two days in advance of filling operations to allow for completion of field quality control testing and for assignment of personnel.
 - c. It shall be Contractor's responsibility to accomplish the specified compaction for fill and other earthwork. Contractor shall control construction operations by confirmation tests to verify and confirm that Contractor has complied, and is complying at all times, with the Contract Documents relative to compaction, control.
 - d. Contractor shall demonstrate adequacy of compaction equipment and procedures before exceeding one or more of the following quantities of earthwork. Each test location shall include tests for each layer, type, or class of fill to finish grade.
 - 1) 200 linear feet of trench fill.
 - 2) 10 cubic yards of select fill.
 - 3) 100 cubic yards of general fill.
 - 4) 50 cubic yards of subbase material.

5. Testing laboratory will inspect and indicate acceptable subgrades and fill layers before construction work is performed thereon. Testing of subgrades and fill layers shall be taken as follows:
 - a. Trenches for Structures, and Underground Facilities (including buried ductbanks):
 - 1) In Open Fields: Two locations every 1,000 linear feet.
 - 2) Along Dirt or Gravel Roads or Off Traveled Right-of-Way: Two locations every 500 linear feet.
 - 3) Crossing Paved Roads: Two locations along each crossing.
 - 4) Under Pavement Cuts or Within Two Feet of Pavement Edges: One location every 400 linear feet.
 - b. Footing Subgrade: For each stratum of soil on which footings will be placed, perform not less than one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Engineer.
 - c. For Select Fill: On 30-foot intervals on all sides of the structure for every compacted lift, but not less than one per lift on each side of the structure for structures less than 60 feet long on a side.
 - d. For General Fill: One per 1,000 square feet on every compacted lift.
 - e. Subbase Material: One per 1,000 square feet on every compacted lift.
6. Periodic compliance tests will be made by Engineer to verify that compaction is complying with the requirements specified, at no cost to Contractor. Contractor shall remove the overburden above the level at which Engineer wishes to test and shall fill and re-compact the excavation after testing is complete.
7. If testing laboratory reports or inspections indicate subgrade, fills, or bedding compaction below specified density, Contractor shall remove unacceptable materials as necessary and replace with specified materials and provide additional compaction at Contractor's expense until subgrades, bedding, and fill are acceptable. Costs for retesting of subgrade, fills, or bedding materials that did not originally comply with specified density shall be paid by Contractor.

+ + END OF SECTION + +

SECTION 32 12 00

FLEXIBLE PAVING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install flexible, hot-mix, hot-laid, asphalt concrete pavement.
2. The Work includes:
 - a. Preparation such as sawcutting, milling where shown or indicated, cleaning, and other preparation for installing flexible pavements.
 - b. Providing asphalt concrete paving materials.
 - c. Providing tack coat material.
 - d. Providing pavement markings where shown or indicated.
 - e. Providing quality controls and testing.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before flexible paving Work.
2. Notify other contractors in advance of installing flexible paving to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before flexible paving Work.

C. Related Sections:

1. Section 09 91 00, Painting.
2. Section 31 23 05, Excavation and Fill.
3. Section 32 16 13, Concrete Curbs, Gutters and Sidewalks.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. AASHTO M320, Specification for Performance-Graded Asphalt Binder.
2. AASHTO MP1a, Specification for Performance-Graded Asphalt Binder.
3. AI MS-2, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
4. ASTM C1371, Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
5. ASTM C1549, Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
6. ASTM D242/D242M, Specification for Mineral Filler For Bituminous Paving Mixtures.
7. ASTM D692/D692M, Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.

8. ASTM D946/D946M, Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
9. ASTM D977, Specification for Emulsified Asphalt.
10. ASTM D1073, Specification for Fine Aggregate for Bituminous Paving Mixtures.
11. ASTM D1188, Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.
12. ASTM D2726, Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
13. ASTM D2950, Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
14. ASTM D3549, Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
15. ASTM D6690, Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
16. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.
17. ASTM E408, Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
18. ASTM E1918, Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
19. ASTM E1980, Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
20. FS TT-P-115, Paint, Traffic, Highway, White and Yellow.
21. USGBC LEED-NC, Reference Guide, For New Construction and Major Renovation.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Asphalt Concrete Production Facility:
 - a. Production facility for asphalt concrete, tack coat materials, and other bitumastic materials shall be certified by the New York State Department of Transportation for furnishing such materials for state highways.
2. Contractor's Testing Laboratory:
 - a. Retain the services of independent testing laboratory to perform testing and determine compliance with the Contract Documents of the materials provided under this Section.
 - b. Do not employ the same laboratory hired by Owner for field quality control testing under the "Field Quality Control" Article of this Section.
 - c. Testing laboratory shall comply with ASTM E329 and requirements of Section 01 45 29.13, Testing Laboratory Services Furnished by Contractor.
 - d. Testing laboratory shall be experienced in the types of testing required.
 - e. Selection of testing laboratory is subject to Engineer's acceptance.

B. Regulatory Requirements:

1. Reference Specifications and Details:

- a. Comply with applicable requirements of New York State Department of Transportation.
 - 2. Obtain required highway and street rights-of-way work permits.
 - 3. Jurisdiction:
 - a. Jurisdiction of paved areas to be constructed are indicated in Section 01 14 33, Work in Highway Rights-of-Way.
- C. Quality Assurance Testing:
- 1. Quality assurance testing is in addition to source quality control testing, when required, and field quality control testing required under Article 3.4 of this Section.
 - 2. Materials used in the Work may require testing and retesting, as directed by Engineer, during the Project. Allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be performed at Owner's expense, including retesting of rejected materials and installed Work, shall be performed at Contractor's expense.
 - 3. Contractor's Quality Assurance Testing Laboratory Scope:
 - a. Use of testing laboratory shall not relieve Contractor of responsibility for providing materials and the Work in compliance with the Contract Documents.
 - b. Quality assurance testing laboratory shall perform the following, unless evidence of material compliance with reference specifications indicated in Paragraph 1.3.B of this Section , is submitted to Engineer by Contractor and asphalt concrete production facility:
 - 1) Test in accordance with reference specifications indicated in Article 1.3 of this Section. In lieu of quality assurance testing, submit evidence and certification of material compliance with reference specifications. When evidence of conformance submitted is not acceptable to Engineer, perform quality assurance testing.
 - c. To facilitate testing services, Contractor shall:
 - 1) Secure and deliver to testing laboratory and Engineer (when requested by Engineer) representative Samples of materials that Contractor proposes to furnish and that are required to be tested.
 - 2) Furnish such labor as is necessary to obtain and handle Samples at the Site or at asphalt concrete production facility and other material sources.
 - 3) Advise testing laboratory and Engineer sufficiently in advance of operations to allow for completion of quality assurance tests and for the assignment of personnel.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Submit the proposed asphalt concrete mix design for each asphalt concrete material, and other bituminous materials, required under this Section, providing complete data on materials, including location in the

Work, source, material content and percentages, temperatures and all other pertinent data. Indicate proportion of bituminous material from reclaimed asphalt pavement.

- b. Proposed gradation for each aggregate to be used in flexible paving. Submit gradation test results for the same material furnished on a previous project. Indicate the proportion of reclaimed asphalt pavement.
- c. In lieu of the information required under Paragraphs 1.4.A.1.a and 1.4.A.1.b, above, submit certificates of compliance with the reference specifications indicated in Article 1.3 of this Section, for each for the following:
 - 1) Each mix design required.
 - 2) Bituminous materials required.
 - 3) Aggregates to be used in flexible paving, from each material source and each required gradation.
 - 4) Density of uncompacted asphalt concrete material.
 - 5) Density of previously-compacted, previously-tested asphalt concrete material.
 - 6) Density and voids analysis for each asphalt concrete material test specimen.
 - 7) Evidence of asphalt concrete plant inspection and compliance with the reference specifications indicated in Article 1.3 of this Section.
 - 8) Proportion of reclaimed asphalt pavement in bituminous materials and aggregate.

2. Product Data:

- a. Manufacturer's complete product data on all pavement marking materials proposed for use, including product literature, specifications, and recommended application techniques and other installation data.

B. Informational Submittals: Submit the following:

- 1. Quality Assurance Test Data Submittals and Source Quality Control Submittals:
 - a. Submit for quality assurance tests and source quality control tests required.
- 2. Delivery Tickets:
 - a. Submit copy of delivery ticket for each load of asphalt concrete, tack coat materials, and other materials obtained from asphalt concrete production facility, signed by Contractor
- 3. Field Quality Control Submittals:
 - a. Submit results of required field quality control testing.
- 4. Qualifications:
 - a. Asphalt concrete production facility, when required by Engineer.
 - b. Contractor's testing laboratory, when required by Engineer.

1.5 SITE CONDITIONS

A. Weather Limitations:

- 1. Temperature:

- a. For base course and binder course paving lifts equal to or greater than two inches thickness, atmospheric temperature shall be 40 degrees F and rising.
 - b. For surface course paving or other pavement courses in lifts less than two inches thick, temperature of surface on which pavement is to be placed shall be 50 degrees F or greater.
2. Prohibitions:
 - a. Do not place flexible paving materials when weather is foggy or during precipitation.
 - b. Do not place flexible paving materials when the base on which the material will be placed contains moisture in excess of optimum.
 - c. Place flexible paving materials only when Engineer concurs that weather conditions are suitable.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. System Description:
 1. Provide subbase course of the thickness shown or indicated, in accordance with Section 31 23 05, Excavation and Fill.
 2. Flexible Pavement Courses:
 - a. Provide the flexible pavement courses indicated below.
 - b. Asphalt Pavement and Subbase:
 - 1) Aggregate Base Course: See Section 31 23 05.
 - 2) Dense Binder Course: 4.5 inches compacted thickness.
 - 3) Surface Course (Wearing Course or Top Course): 1.5 inches compacted thickness.

2.2 ASPHALT CONCRETE MIXES

- A. Asphalt Concrete Mixtures: Provide the following materials designed and manufactured in accordance with reference specifications indicated in Article 1.3 of this Section:
 1. Binder Course: NYSDOT Item No. 403.138902, Asphalt Concrete – Type 3 Binder Course.
 2. Surface Course (Wearing Course, Top Course): NYSDOT Item No. 403.198202, Asphalt Concrete – Type 7 F2 Top Course.

2.3 BITUMINOUS MATERIALS

- A. Bituminous Materials for Asphalt Concrete:
 1. Bituminous materials for asphalt concrete shall comply with the reference specifications indicated in Article 1.3 of this Section, for the asphalt concrete mixes specified.

2. Bituminous Materials from Reclaimed Asphalt Pavement (RAP): When use of RAP in bituminous materials is acceptable, comply with requirements for RAP in Article 2.4 of this Section.
- B. Tack Coat:
1. Tack coat shall be emulsified asphalt.
 2. Provide Item 401, in accordance with reference specifications indicated in Article 1.3 of this Section.
- C. Crack Sealant:
1. Provide Item 705-2, in accordance with reference specifications indicated in Article 1.3 of this Section.

2.4 AGGREGATES IN FLEXIBLE PAVEMENTS

- A. Aggregates for Asphalt Concrete – General:
1. Aggregate materials used in flexible pavement shall be in accordance with the reference specifications indicated in Article 1.3 of this Section, for the asphalt concrete mix designs indicated.
- B. Reclaimed Asphalt Pavement (RAP):
1. Processed material obtained by milling or full depth removal of existing asphalt concrete pavement may be used as aggregate in asphalt concrete base course and binder course.
 2. Maximum proportion of RAP in the asphalt concrete provided shall comply with requirements of the reference specifications indicated in Article 1.3 of this Section.
 3. When RAP is used, comply with Contract Documents requirements for the applicable asphalt concrete course mix design, bituminous materials, and aggregates.

2.5 PAVEMENT MARKING MATERIALS

- A. Material: Pavement marking materials shall be in accordance with Section 09 91 00, Painting, for pavement marking paint.
- B. Colors:
1. Roadway Center Markings Between Opposing Traffic Lanes: Yellow.
 2. Roadway Side Striping: White, unless otherwise shown or specified. On roads with divided median, right-side striping of each direction shall be white, and left-side striping shall be yellow.
 3. Roadway Miscellaneous Lane Markings (turn lane arrows and text): White.
 4. No-Parking Areas: Yellow.
 5. Handicap Parking Spaces: Unless otherwise indicated with signs, provide handicap symbol on pavement with white paint on blue background.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine the subbase and base on which flexible paving will be installed. Notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.
- B. Do not place materials on subgrades, or subbase that is muddy or has water thereon.

3.2 PREPARATION

- A. Preparation: Before starting installation of flexible paving, perform the following:
 - 1. Grade Control: Establish and maintain throughout flexible paving installation the required lines and grades, including crown and cross-slope for each asphalt concrete course during construction operations.
 - 2. Prepare subgrade and provide subbase for flexible pavement in accordance with Section 31 23 05, Excavation and Fill. Before installing flexible pavement, obtain Engineer's concurrence that subgrade and subbase are suitable for installing flexible pavement.
 - 3. Coordinate placement of flexible pavement with the Work included under Section 32 16 13, Concrete Curbs, Gutters and Sidewalks, and Work including drainage structures, manholes, valve boxes, and similar items.
 - 4. Provide appropriate maintenance and protection of traffic measures during placement of pavement.
- B. Milling:
 - 1. Perform milling of existing pavement where shown or indicated.
 - 2. "Milling" consists of the milling, shaping, and removing portions of existing surfaces by cold milling process and subsequent cleaning.
 - 3. Milling Equipment:
 - a. Milling machines shall be power-operated, self-propelled machines capable of removing the desired thickness of existing surfaces. Machines shall have sufficient power, traction, and stability to accurately maintain depth of cut and slope. Machines shall produce a finished profile and cross slope to within 1/4 inch of that required and shall produce uniform surface texture free of gouges and ridges greater than 3/8-inch deep.
 - b. Machines shall be equipped with a means to control dust and other particulate matter created by the cutting action.
 - c. Provide equipment that removes milled material as quickly as the rate of milling.
 - d. Use vacuum trucks, street sweepers or power brooms to clean milled surfaces.
 - 4. Milling Operations:
 - a. Perform milling to so that, when final course of pavement is placed, required elevations and grades are provided. Where required, establish a taut reference string line to control line and grade of milling.
 - b. Minimize the time between milling and placement of pavement over milled surface.

- c. Areas not accessible to the milling machine, such as around or adjacent to drainage structures, manholes, curbs, and transverse joints on structures, may be removed by a small milling machine, handwork or other method acceptable to Engineer.
- d. Remove milled material as soon as it is milled. Remove fines and other material prior to opening milled area to traffic. Control objectionable dust emissions. When traffic has been allowed into milled area or when more than 48 hours have elapsed since milling, clean the milled area again prior to applying tack coat.
- e. Maintain drainage to drainage inlets and other drainage structures in a manner acceptable to Engineer.
- f. Properly dispose of milled material at a location away from the Site.

C. Surface Preparation:

- 1. Repair surface defects in existing pavement to provide uniform surface to receive new pavement.
- 2. Provide crack sealant to completely fill cracks more than 1/16-inch wide in areas shown or indicated on the Drawings.
- 3. Clean existing surfaces over which asphalt concrete pavement will be installed, by removing from the surface foreign material, excess asphalt concrete, excess joint sealant, and crack filler, and other undesirable matter.
- 4. Provide tack coat as indicated in Article 3.3 of this Section.

3.3 INSTALLATION OF FLEXIBLE PAVING

A. General:

- 1. Provide final pavement surfaces of uniform texture, at required grades and cross-sections.
- 2. Construct roadways to the lines, grades, and typical sections shown or indicated.

B. Installation of Asphalt Concrete:

- 1. Asphalt concrete mixture shall be transported to the site of paving and placed as soon as possible after mixing.
- 2. Placement of each asphalt concrete course shall be completed over the full width of the section under construction during each day's paving operations.
- 3. Spread and finish asphalt concrete courses by means of self-propelled mechanical spreading and finishing equipment. Compacted thickness of layers placed shall not exceed 150 percent of specified thickness unless approved in writing by Engineer.
- 4. Compaction:
 - a. Rollers:
 - 1) Use sufficient rolling equipment to satisfactorily compact and finish the quantity of asphalt concrete placed. There shall be not less than two rollers on the Project at all times. When acceptable to Engineer, one of the rollers may be a pneumatic-tire roller.
 - 2) During rolling operations, roller speed shall not exceed three miles per hour. When sufficient number of rollers is not available, reduce the

quantity of asphalt concrete placed to accommodate the available rollers' speed.

- 3) Required rollers shall be at the Site, in acceptable operating condition, prior to placing of asphalt concrete.
- 4) Use of vibratory rollers in lieu of steel-wheeled rollers is acceptable, however when thickness of asphalt concrete is one-inch or less, rolling shall be in the static mode.
- b. Rolling of initially-placed asphalt concrete material, or breakdown rolling, shall begin as soon as the asphalt concrete mixture will bear the roller without undue displacement.
- c. Rolling shall be longitudinal, overlapping on successive trips by not less than one-half roller rear wheel width, and not more than three-quarters of roller rear wheel width. Alternate trips of the roller shall be of slightly different lengths.
- d. At all times, roller motion shall be slow enough to avoid displacing the asphalt concrete.
- e. Operate rollers continuously from breakdown of laid asphalt concrete through finish rolling.
- f. Perform finish rolling using a steel-wheeled roller or a vibratory steel-wheel roller operating in the static mode.
- g. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
- h. At each location not accessible to roller, thoroughly compact asphalt concrete with tampers and finish, where necessary, with a hot smoothing iron to provide uniform, smooth layer over the entire area so compacted.
5. Each compacted asphalt concrete course shall be within plus or minus 1/4-inch of the indicated thickness.
6. Placement of Adjacent Strips of New Asphalt Concrete:
 - a. When more than one width of asphalt concrete material will be placed, a six-inch wide strip of asphalt concrete adjacent to the area on which the future material is to be placed shall not be rolled until such future material is placed.
 - b. Do not leave the unrolled strip unrolled for more than two hours after placement, unless the six-inch unrolled strip is first heated with a joint heater.
 - c. After the first strip or width of asphalt concrete is compacted, place, finish, and compact the second width or strip as required for the first width, except that rolling shall be extended to include the six-inch strip of the first width not previously compacted.

C. Construction Joints:

1. Construction joints shall be made in such a manner as to ensure a neat junction, thorough compaction, and bond throughout.
2. Provide a transverse joint extending over the full width of the strip being laid and at right angles to its centerline at end of each workday and at other times when the placement of hot-mix asphalt concrete will be suspended for a period of time that will allow asphalt concrete mixture to chill.

3. Thoroughly compact by rolling the forward end of a freshly laid strip of asphalt concrete before the asphalt concrete mixture becomes chilled. When the Work is resumed, the end shall be cut vertically for the full depth of the layer.
- D. Joining of Pavements:
1. When pavement is to join existing or previously-laid pavement, the existing or previously-laid pavement shall be neatly and carefully edged to allow for overlapping and feathering of the subsequent course of asphalt concrete material.
 2. Where new pavement is to meet existing pavement, the existing pavement shall be sawcut and notched.
 3. Where new pavement will meet existing asphalt pavement, remove existing pavement 12 inches onto undisturbed existing pavement course at edges where new pavement will meet existing pavement.
 4. Tack Coat:
 - a. Provide tack coat material at the following locations:
 - 1) At edges where new pavement will connect to existing or previously-installed pavement.
 - 2) On surface of existing or previously-installed pavement course over which new pavement will be installed, prior to placement of the subsequent pavement course. Tack coat may be deleted when a succeeding layer of asphalt pavement is being applied over a freshly-placed asphalt pavement course that has been subjected to very little or no traffic, with approval of Engineer
 - 3) Where new pavement will abut curbing, concrete gutters, drainage structures and frames, manhole cover frames, valve boxes, and similar items.
 - b. Tack Coat Installation: Install tack coat immediately prior to installing pavement. Place pavement while tack coat is wet. Apply tack coat in accordance with reference specification indicated in Article 1.3 of this Section.
- E. Curing:
1. Do not allow traffic onto pavement until directed by Engineer. Traffic will not be allowed on new asphalt concrete pavement until surface temperature is less than 140 degrees F.
 2. Hold construction traffic on new pavement to a minimum as acceptable to Engineer.
- F. Asphalt Concrete Curbs: Provide extruded asphalt curbs of the height and profile indicated on the Drawings.
- G. Defective Pavement Work:
1. When directed by Engineer, remove and replace defective flexible paving Work. Cut out such areas of defective pavement and fill with fresh asphalt concrete materials, compacted to required density.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. Responsibility:
 - a. Owner's field quality control testing laboratory will:
 - 1) Perform field density tests to verify that required compaction of asphalt materials has been obtained.
 - 2) Test the proposed materials for compliance with the Contract Documents, as directed by Engineer.
 - 3) Submit reports of all test results to Engineer and Contractor.
 - b. Authority Field Quality Control Testing Laboratory:
 - 1) Technicians representing the testing laboratory will inspect materials at the Site and perform required testing. When the materials furnished or Work performed do not comply with the Contract Documents, field quality control testing laboratory technician shall direct the attention of Engineer and Contractor to such non-compliance.
 - 2) Testing laboratory personnel shall not act as foreman or perform other duties for Contractor. The Work will be checked as it progresses, but failure to detect defective Work shall not in any way prevent the later rejection of such defective Work when defect is discovered. Failure to detect defective Work as it occurs does not obligate Engineer to final acceptance. Testing laboratory personnel are not authorized to revoke, alter, relax, enlarge, or release requirements of the Contract Documents, nor to approve or accept any portion of the Work.
2. Asphalt Concrete Mix Temperature: Measure temperature at time of placement, record, and submit to Engineer.
3. Surface Smoothness:
 - a. Test finished surface of each flexible paving course for smoothness, using a ten-foot straightedge applied parallel to and at right angles to centerline of paved areas.
 - b. Check surfaced areas at intervals as directed by Engineer.
 - c. Surfaces will be acceptable relative to smoothness when measurements are equal to or less than the following:
 - 1) Base Course: 3/8-inch vertical in ten feet horizontal.
 - 2) Binder Course: 3/8-inch vertical in ten feet horizontal.
 - 3) Surface Course (Wearing Course): 1/4-inch vertical in ten feet horizontal.
 - d. Elevation: Finished surface of pavement shall be within plus or minus 1/2-inch of elevations shown or indicated.
4. Density:
 - a. Test Method: ASTM D2950 nuclear method; test one sample every 1,000 square yards of pavement. Test for each asphalt concrete course installed.
 - b. In addition, when directed by Engineer, compare density of in-place flexible paving materials against laboratory specimen or certificates on same asphalt pavement mixture, using nuclear density device.
 - c. Criteria for Acceptance: Density of in-place asphalt pavement material shall be not less than 90 percent of the recorded laboratory specimen or certificate density. Density shall be not greater than 98 percent.

5. Repair holes from test specimens in accordance with this Section's requirements for repairing defective Work.

3.5 ADJUSTING

A. Frames and Covers:

1. Set frames of drainage structures, manholes, valve boxes, and similar items to final grade. Adjust frames of existing structures and frames furnished under other Sections. Frames shall be substantially similar elevation to finished surface course of pavement.
2. Replace covers and gratings of existing structures immediately following adjusting associated frames. Install covers and gratings of structures provided under the Project as quickly as possible.
3. Where there is a delay between adjusting of frames and installation of surface course, provide temporary bituminous material around perimeter of each frame to smooth vehicle access over the frame. Maintain and repair temporary bituminous material as required until placement of surface course. Remove temporary bituminous material before installing surface course.

B. Pavement Adjustment:

1. Repair or replace in manner acceptable to Engineer areas of pavement that are observed to pond or collect water.

3.6 CLEANING

- #### A. Cleaning:
- After completing the paving operations, clean surfaces of excess or spilled bituminous materials, excess asphalt concrete, and foreign matter.

3.7 PROTECTION

- #### A. Protect finished pavement until pavement has become properly hardened and cool.
- #### B. Cover openings of drainage structures, manholes, valve boxes, and similar items in the paved area until permanent coverings are provided.

3.8 PAVEMENT MARKINGS

- #### A. Provide pavement markings at the locations shown or indicated, in accordance with Section 09 91 00, Painting.

+ + END OF SECTION + +

SECTION 32 16 13

CONCRETE CURBS, GUTTERS, AND SIDEWALKS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete curbs, gutters, and sidewalks.
2. Types of Work required under this Section include:
 - a. Conventionally-formed or machine-formed curb and sidewalk.
3. Width, thickness, geometry, and extent of curb, gutter, and sidewalk shall be as shown or indicated on the Drawings.
4. Requirements for concrete sidewalks apply to concrete driveways, unless otherwise shown or specified, or unless concrete pavement requirements are included in the Contract Documents.

B. Related Sections:

1. Section 03 00 05, Concrete.
2. Section 32 12 00, Flexible Paving.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. AASHTO M252, Specification for Corrugated Polyethylene Drainage Pipe.
2. ASTM D1248, Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
 - a. Installer shall have not less than two years experience installing concrete curbs, gutters, and sidewalks similar to those required for the Work.
 - b. When required by Engineer, submit record of experience documenting not less than three successful, completed projects. For each project, submit name the following information: project name, location of project, approximate quantity of concrete curb, gutter, and sidewalk constructed by installer, contract price of concrete curb, gutter, and sidewalk construction, and name and contact information for project owner and the project's construction-phase engineer.

B. Regulatory Requirements:

1. Reference Specifications and Details:

- a. Comply with applicable requirements of New York State Department of Transportation Standard Specifications and Standard Details.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

- 1. Shop Drawings:
 - a. Submit concrete mix design when mix design is different from that submitted under Division 03 Sections on concrete. Submit in accordance with Division 03 Sections on concrete.
 - b. Proposed reinforcing materials.
 - c. Schedule of proposed underdrain piping sizes and materials by location in the Project.
- 2. Product Data:
 - a. Concrete Materials: Submit Supplier's technical information for materials proposed for use, when concrete materials are different from those submitted under Division 03 Sections on concrete.
 - b. Reinforcing Steel: Submit fabricator's technical information, including catalog information and specifications, for materials proposed for use, sufficient for Engineer to verify compliance with the Contract Documents.
 - c. Expansion Joint Filler: Submit Supplier's technical information, including manufacturer's product data, brochure, and specifications, for materials proposed for use, when materials are different from those submitted under Division 03 Sections on concrete.
 - d. Underdrain Piping: Manufacturer's product data, brochure, and specifications for underdrain piping proposed for use.

B. Informational Submittals: Submit the following:

- 1. Certifications:
 - a. When concrete materials are different from those approved under Division 03 Sections on concrete, submit certifications as required in concrete Specifications Sections referred to in this Section.
- 2. Site Quality Control Submittals:
 - a. Concrete test results for the Work included under this Section.
- 3. Qualifications Statements:
 - a. Installer, when requested by Engineer.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Comply with Division 03 Sections on concrete referenced in this Section.

1.6 SITE CONDITIONS

A. Weather and Temperature Limitations:

- 1. When temperature and environmental conditions warrant, comply with requirements for cold weather placing and hot weather placing under Division

03 Sections referenced in this Section, unless otherwise required under this Section.

2. Temperature of aggregate base material under concrete shall be 39 degrees F or higher. Aggregate base material shall not have snow, ice, frost, or standing water on its surface at the time of concrete placing. Use of insulating materials and heating equipment may be required before concrete placing begins.
3. Discontinue concrete placing when the air temperature falls below 39 degrees F. Do not place concrete in the rain.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Aggregate Bedding Material for Curbs, Sidewalks, and Gutters: Subbase material in accordance with Section 31 23 05, Excavation and Fill, unless otherwise shown or indicated.
- B. Concrete Materials:
 1. Comply with applicable requirements of: Section 03 00 05, Concrete; including requirements for formwork, concrete materials, admixtures, bonding materials, curing materials, and others as required.
 2. Concrete Mix, Design, and Testing:
 - a. Comply with applicable requirements of Section 03 00 05, Concrete, for concrete mix design, sampling, and testing, and quality control.
 - b. Design the mix to produce concrete of properties of compressive strength, slump range, and air content as specified in Section 03 00 05, Concrete.
 - c. When machine-formed equipment is used for constructing concrete curbs, sidewalks, or gutters, concrete so placed shall have properties in accordance with Section 03 00 05, Concrete, except that maximum slump shall be 2.5 inches and air content shall be two percent of design.
- C. Reinforcing Materials:
 1. Provide deformed steel bars and smooth wire fabric complying with Section 03 00 05, Concrete.
 2. Provide wire fabric in flat sheets. Do not furnish wire fabric in rolls.
 3. Unless otherwise shown or indicated, provide for sidewalks reinforcing not less than six-inch by six-inch, no. 6"x6"x10 Gauge wire fabric.
- D. Expansion Joint Material:
 1. Preformed Expansion Joint Filler: Comply with Section 03 00 05, Concrete for preformed expansion joint fillers.
 2. Joint Sealant: For joint sealants and accessories used on expansion joints, comply with Section 07 92 00, Joint Sealants.
- E. Perforated Underdrain Piping:

1. Provide the material shown or indicated. When material is now shown or indicated, provide the following:
2. Size: Provide underdrain piping of the sizes shown or indicated on the Drawings. For circular underdrain piping, unless otherwise indicated, use pipe with inside diameter of not less than four inches.
3. Pipe Material:
 - a. Provide perforated, corrugated polyethylene underdrain piping.
 - b. Corrugated polyethylene tubing and fittings four- through ten-inch diameter shall comply with AASHTO M252, except that tubing manufactured from material complying with ASTM D1248, Class B, is also acceptable.
 - b. Corrugated polyethylene tubing and fittings 12-inch diameter shall comply with AASHTO M252 except the pipe stiffness requirement shall be 45 psi at five percent deflection.
4. Underdrain Bedding Material: Shall be as shown on the Drawings. If not shown, material shall be pipe bedding stone in accordance with Section 31 23 05, Excavation and Fill.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine subgrade, subbase, and conditions under which the Work is will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.
- B. Subgrade:
 1. Verify that earthwork is completed to correct line and grade.
 2. Verify that subgrade is smooth, properly compacted, and free of frost and excessive moisture in accordance with Division 31 Section on excavation and fill.
 3. Do not commence the Work under this Section until conditions are satisfactory.

3.2 AGGREGATE BASE FOR CURBS, SIDEWALKS, AND GUTTERS

- A. Aggregate Base under Curb, Gutter, or Sidewalk:
 1. Install aggregate fill in accordance with Section 31 23 05, Excavation and Fill. Properly compact aggregate fill to thickness shown or indicated in the Contract Documents.
 2. When thickness of aggregate base is not shown or indicated, provide six-inch thick aggregate base under curbs, sidewalks, and gutters.

3.3 PERFORATED UNDERDRAIN PIPING

- A. Preparation for Underdrain Piping:

1. Provide leveled and compacted bed of the required underdrain bedding material just prior to installing the underdrain piping. Slope bedding as shown and as required for drainage of underdrain piping.
- B. Installation of Underdrain Piping:
1. Install underdrain piping in accordance with pipe manufacturer's recommended installation procedures.
 2. Upgrade end of corrugated polyethylene underdrain pipe shall be closed with a solid plastic cap.
 3. Unless otherwise shown or required by Engineer, install underdrain pipe with perforations down.
 4. Install piping to drain to suitable discharge location.
 5. When polyethylene underdrains are daylighted through the side slope protect end of pipe from sunlight by providing section of corrugated steel or aluminum pipe, not less than three feet long, at the outlet. Extend the metal pipe not less than six inches into the ground and shall overlap the perforated underdrain piping by not less than the diameter of the underdrain pipe.
- C. Acceptability of Underdrain Piping:
1. With Engineer, visually inspect installed underdrain piping after installation and prior to filling and placing additional construction over underdrain piping. Piping will be acceptable when it is verified as installed on acceptable grade for drainage, is installed in accordance with the Contract Documents, and is free of damage and defects.

3.4 CONSTRUCTION OF FORMS

- A. Conventional Forms:
1. Set forms to line and grade. Forms shall be free from warp.
 2. Install forms along full length of curb, gutter, and sidewalk.
 3. Forms shall extend to the full depth of the curb, sidewalk, and gutter (as applicable) and be secured so no displacement occurs during concrete placing.
- B. At Contractor's option, machine-formed concrete curbs, sidewalks, and gutters are acceptable.

3.5 REINFORCING

- A. General:
1. Locate, place, and support reinforcing in accordance with Section 03 00 05, Concrete, unless otherwise shown on the Drawings.
 2. Size of reinforcing shall be as shown or indicated in the Contract Documents.
 3. Unless otherwise shown or indicated, locate reinforcing for sidewalks at the mid-depth point in the concrete slab.

3.6 CONCRETE PLACING

- A. General:

1. Comply with Section 03 00 05, Concrete, and this Section relative to mixing and placing concrete.
- B. Placing:
1. Curbs and Gutters: Place concrete using methods that prevent segregation of the mix. Consolidate concrete along face of forms with an internal vibrator.
 2. Sidewalks: Place concrete in one-course, monolithic construction, for full width and depth of sidewalk.
 3. Machine-Formed:
 - a. At Contractor's option, automatic curb, gutter, and sidewalk machine may be used for installing concrete.
 - b. Machine forming shall produce curbs, gutters, and sidewalks of required cross-section, lines, grades, finish, and jointing, as specified for conventionally-formed concrete.
 - c. At curb cuts and driveway entrances, cut-out concrete and hand-finish the curbing to provide the required curb cut or driveway entrance, as applicable.
 - d. If results do not comply with the Contract Documents, remove and replace at no additional cost to Owner.
- C. Curbs:
1. Provide curb-cuts and driveway entrances for vehicle passage and pedestrian passage where shown, and when not shown but where existing sidewalks and curbs are being replaced, provide curb-cut or driveway entrance (as applicable) at location of existing driveways and pedestrian access ramps in sidewalks.
 2. Neatly form transitions from curb to curb-cut or driveway entrance.
 3. Unless otherwise shown or indicated, top of curb at curb-cut or driveway entrance shall be not greater than 1/4-inch above elevation of finished pavement surface.
- D. Gutters:
1. Unless otherwise shown or indicated, top of gutter shall be not greater than 1/4-inch above elevation of finished pavement surface.

3.7 JOINTS

- A. General:
1. Provide expansion joints, contraction joints, and construction joints in concrete curbs, gutters, and sidewalks.
 2. Provide expansion, contraction, and construction joints perpendicular to formed faces of curb, gutter, or sidewalk.
 3. Construct transverse joints at right angles to the Work centerline and as shown.
- B. Contraction Joints: Provide joints as indicated below:
1. Curbs and Gutters: Provide at intervals of ten feet on centers. Joint shall be not less than 1/8-inch and not more than 1/4-inch in width, and have a depth of 1.5 inches.

2. Sidewalks: Provide at intervals of five feet on centers. Joint shall be not less than 1/8-inch and not more than 1/4-inch in width, and have a depth of not less than one-third the total thickness of concrete sidewalk.
 3. Joints may be formed or sawcut.
- C. Construction Joints: Place construction joints at locations where concrete placing operations are stopped for more than 30 minutes, except where such pours terminate at expansion joints.
- D. Expansion Joints:
1. General: Provide preformed expansion joint filler at locations indicated. When curb, gutter, or sidewalk is not poured monolithically, provide expansion joints where each abuts the other.
 2. Curbs and Gutters: Provide 1 1/16-inch wide preformed expansion joint filter at the intervals of 30 feet along curb and gutter; at expansion joints in pavement; at movable structures (such as bridges); and between curb or gutter and structures, returns, and at 30-foot intervals along length of curb or gutter.
 3. Sidewalks: Provide 1/2-inch wide preformed expansion joint filler at 30-foot intervals along length of sidewalk and at all joints between sidewalk and: curb, gutters, pavement, buildings, drainage structures, utility metal appurtenances such as manhole cover frames and valve boxes, and similar construction.
 4. Place top of expansion joint material not less than 1/2-inch or more than one-inch below concrete surface. Apply joint sealer on top of expansion joint material flush with concrete surface, and in accordance with sealant manufacturer's instructions and Section 07 92 00, Joint Sealants.

3.8 CONCRETE FINISHING

- A. Smooth exposed surface by screeding and floating. Perform hand-screeding when conventionally-formed concrete is provided.
- B. Work edges of gutter and sidewalks, back top edge of curb, and transverse joints; and round to 1/4-inch radius.
- C. Complete surface finishing by drawing a fine-hair broom across surface, perpendicular to line of traffic.

3.9 CURING

- A. General:
1. Protect and cure finished concrete curbs, gutters, and sidewalks, in accordance with Section 03 30 05, Concrete.
 2. Cure driveways and sidewalks at driveways for not less than three days prior to opening to vehicle traffic. In colder weather, as indicated in Article 1.6 of this Section, curing period shall be not less than six days prior to opening to vehicle traffic unless other provisions to determine strength are provided and approved by Engineer.

3.10 REPAIR AND CLEANING

- A. Repair or replace broken or defective curbs, gutters, and sidewalk as directed by Engineer.
- B. Sweep the concrete curb, sidewalk, and gutter Work and wash free of stains, discolorations, dirt, and other foreign material.

+ + END OF SECTION + +

SECTION 32 31 00

FENCING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to furnish and install fencing.
2. Extent of fencing is shown or indicated.
3. Types of materials required under this Section include:
 - a. Aluminum-coated, steel chain link fabric.
 - b. Galvanized steel framework.
 - c. Grounding and bonding.
 - d. Auxiliary system components, gates, accessories, fasteners, and fittings.
4. Substitutions: Structural shapes of satisfactory sections and equal strengths may be substituted upon Engineer's approval of Contractor's substitution request.

B. Related Sections:

1. Section 03 00 05, Concrete.
2. Section 09 91 00, Painting.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
2. ASTM A90/A90M, Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
3. ASTM A123, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
4. ASTM A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A428/A428M, Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles.
6. ASTM A491, Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
7. ASTM A780, Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
8. ASTM A817, Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric.

9. ASTM A1011/A1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
10. ASTM B6, Specification for Zinc.
11. ASTM D412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension.
12. ASTM D746, Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
13. ASTM D792, Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
14. ASTM D1499, Practice for Filtered Open-Flame Carbon-Arc Exposures of Plastics.
15. ASTM D2240, Test Method for Rubber Property—Durometer Hardness.
16. ASTM F552, Terminology Relating to Chain Link Fencing.
17. ASTM F567, Practice for Installation of Chain-Link Fence.
18. ASTM F626, Specification for Fence Fittings.
19. ASTM A653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
20. ASTM F900, Specification for Industrial and Commercial Swing Gates.
21. ASTM F1043, Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
22. ASTM F1083, Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
23. ASTM F1184, Specification for Industrial and Commercial Horizontal Slide Gates.
24. CLFMI CLF 2445, Product Manual.
25. CLFMI, Step-by-Step Installation Guide.
26. IEEE C2, National Electrical Safety Code.
27. IEEE 81, Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements.
28. UL 467, Grounding and Bonding Equipment.

1.3 TERMINOLOGY

- A. The following words or terms are not defined but, when used in this Section, have the following meaning.
 1. “Knuckling” describes the type of selva obtained by interlocking adjacent pairs of wire ends and then bending the wire ends back into a closed loop.
 2. “Gate operating cycle” is one gate opening plus one gate closing.
 3. “Fencing” describes an assembly of metal components, including wire chain-link fabric fastened to top, bottom and intermediate horizontal rails and to vertical line posts, corner posts and terminal posts. This assembly includes all auxiliary components, gates, fittings, fasteners, and other accessories, all with specified protective coatings.
- B. Terminology used in this Section and not defined in this Article will be construed in accordance with the terminology used in CLF 2445 and ASTM F552.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Erector/Installer:

- a. Engage a single erector that is skilled and trained, and possesses successful and documented experience installing fencing, and employs only workers with specific skill and successful experience in the type of Work required.
- b. Erector shall be acceptable to fencing manufacturer,
- c. Submit name and qualifications of erector with the following information for a minimum of three successful projects:
 - 1) Names and telephone numbers of owner and architect or engineer responsible for project.
 - 2) Approximate fencing contract amount.
 - 3) Quantity of fencing installed.

B. Component Supply and Compatibility:

1. Provide fencing as complete system with all gates, hardware, appurtenances and other components produced by a single manufacturer, including custom erection accessories, fittings, clamps, and fastenings as required for complete system.

C. Regulatory Requirements:

1. Comply with Laws and Regulations, including:
 - a. Americans with Disabilities Act of 1990 (Public Law 101-336), Appendix A of 28 CFR 36, Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Drawings at scale of 1/4-inch equal to one foot of typical fence assembly, identifying all materials, dimensions, sizes, weights, and finishes of rails, posts, braces, supports and other fencing components. Show fence heights, and locations of gates. Show gate swing, or other operation, hardware, and accessories. Include plans, elevations, and sections, with required installation and operating clearances, and details of post anchorage, attachments, and bracing.
- b. List of all hardware, fasteners, and accessories.

2. Product Data:

- a. Copies of manufacturer's technical product information, and specifications for all fencing components, including auxiliary system components such as gate operators and motors.
- b. Data substantiating that materials proposed comply with the following:
 - 1) Weight of aluminum coating on wire fabrications, in compliance with ASTM A428.

- 2). Weight of zinc coating on pipe fabrications, in compliance with ASTM A90.
 3. Samples: Engineer's review will be for color and texture only. Compliance with other requirements is Contractor's responsibility. Submit the following:
 - a. Each fencing component, fastener, post, rail, support, chain-link fabric type, and other auxiliary and miscellaneous items labeled with identification of proposed use and location.
 - b. Sample of each chain-link fabric material, six inches square; and framework members, and typical accessories, each approximately six inches long.
 - c. Full range of manufacturer's standard and custom color Samples.
- B. Informational Submittals: Submit the following:
1. Certifications:
 - a. Submit shipping list for materials used, endorsed with manufacturer's voucher, signed by authorized employee of manufacturer, certifying that material used in fencing complies with the Contract Documents and with the approved submittals.
 2. Design Data: Submit with the Shop Drawings:
 - a. All structural calculations verifying that all system components comply with requirements of authorities having jurisdiction at the Site.
 - b. When proposing fencing framework or other structural components that varies from the Contract Documents, submit fabricator's structural calculations for design of proposed fencing. Structural analysis shall verify that all system components including supports, gates, fasteners, fittings, and connections comply with the Contract Documents and requirements of authorities having jurisdiction at the Site.
 3. Manufacturer's Instructions:
 - a. Manufacturer's installation instructions.
 4. Field Quality Control Submittals:
 - a. Indicate and interpret test results for compliance of chain link fence and gate grounding and bonding with performance requirements specified in the Contract Documents.
 5. Qualifications Statements:
 - a. Erector.
- C. Maintenance Material Submittals: Submit the following:
1. Extra Stock Materials:
 - a. Furnish extra stock materials from same manufactured lot as materials installed.
 - b. Provide minimum of five percent excess over required amount of fencing components. Pack in cartons and store at the Site where directed by Owner.
 - c. Do not provide partial containers or packages of materials. Round-up quantities to furnish only complete, unopened, and undamaged containers and packages.

- d. Submit quantities of each system component required for the Work, based on actual purchase order to manufacturer for materials to be used for this Project, with calculations substantiating quantity of extra stock materials furnished.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
 - 1. Packaging and Marking: Comply with CLFMI CLF 2445.
 - 2. Deliver materials in manufacturer's original, unopened packaging with all factory-applied tags, labels and other identifying information intact, legible and accurately representing material on approved submittals.
- B. Storage of Materials:
 - 1. Store all materials under weatherproof cover, off the ground and away from other construction activities.
 - 2. Do not store material in a manner that would create a humidity chamber. Provide for free movement of air under protective cover and between components of the fencing.
- C. Handling of Materials:
 - 1. Handle material in manner that is in compliance with manufacturer's recommendations and that avoids damaging coatings.

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities unless allowed:
 - 1. in Section 01 14 16, Coordination with Owner's Operations; or
 - 2. under the following conditions, only after providing temporary utility services according to requirements indicated.
 - a. Notify Engineer and Owner not less than five days in advance of proposed utility interruptions.
 - b. Do not proceed with utility interruptions without Engineer's written permission.
- B. Obtain measurements at the Site to verify layout information and dimensions for fencing and gates in relation to reference points provided by Owner or indicated in the Contract Documents.

1.8 WARRANTY

- A. General Warranty: The special warranties specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to and run concurrent with other warranties made by Contractor under the Contract Documents.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Considerations:

1. Verify size of framing members shown or indicated in the Contract Documents. Where structural analysis indicates the need, provide additional members, or increased member size, thickness or weight.
2. Modifications may be made only as necessary to meet Site conditions to ensure proper fitting and support of the Work and only upon submittal of Shop Drawings and receipt of approval by Engineer.

2.2 MATERIALS

A. General:

1. Tube sizes specified are nominal outside dimension.
2. Roll-formed section sizes are nominal outside dimensions.
3. Wire gages shall conform to American Steel and Wire Company gage.
4. Heat-form arcs and chords before applying protective coatings to metal.
5. Sizes specified are given for uncoated metal. Protective coatings are in addition to specified metal dimensions, gages, and sizes.
6. Provide weights of zinc and aluminum coatings on wire and pipe fabrications in accordance with CLFMI CLF 2445.

B. Chain-Link Fence Fabric:

1. One-piece fabric widths, for fencing 12 feet and less in height, complying with CLFMI CLF 2445.
2. Wire mesh shall be woven throughout in form of approximately-uniform square mesh with parallel sides and horizontal and vertical diagonals of approximately-uniform dimensions, of size and gage specified and in compliance with ASTM A817, Type 1, cold-drawn carbon steel wire with minimum breaking strength of 2,170 pounds and coated with aluminized finish, as specified. Fabric shall be as recommended by CLFMI for heavy industrial usage.
3. Provide fence fabric imprinted with manufacturer's trade name, country of origin, core wire gage, and finished outside diameter gage.
4. Provide fabric knuckled to eliminate exposure of sharp edges.
5. Fabric Gage: Provide the following:
 - a. No. 9-gage wires.
6. Mesh Size: Provide the following:
 - a. Two-inch mesh.

2.3 FRAMEWORK

- A. General: The following table presents actual OD and equivalent nominal NPS size and trade size of round members:

Actual OD (inches)	NPS Size (inches)	Trade Size (inches)
1.315	1.0	1-3/8

1.660	1.25	1-5/8
1.900	1.5	2
2.375	2.0	2.5
2.875	2.5	3
3.500	3.0	3.5
4.000	3.5	4
6.625	6.0	6-5/8
8.625	8.0	8-5/8

B. Pipe shall be commercial grade, plain-end steel pipe with standard-weight walls. Steel strip used for manufacture of pipe shall comply with ASTM F1083, Schedule 40 pipe with minimum yield strength of 25,000 psi and protected with zinc, as specified.

C. Fittings: Comply with ASTM F626.

D. End, Corner, and Pull Posts: Provide end, corner, and pull posts of following minimum sizes:

1. Up to six feet fabric height:
 - a. 2.375 inches OD pipe weighing 3.65 pounds per linear foot.
2. Over six feet fabric height and less than eight feet fabric height:
 - a. 2.875 inches OD pipe weighing 5.79 pounds per linear foot.
3. Over eight feet fabric height:
 - a. 3.50 inches OD pipe weighing 7.58 pounds per linear foot.

E. Line Posts: Provide line posts of following minimum sizes and weights:

1. Up to six feet fabric height:
 - a. 1.90 inches OD pipe weighing 2.72 pounds per linear foot.
2. Over six feet fabric height and less than eight feet fabric height:
 - a. 2.375 inches OD pipe weighing 3.65 pounds per linear foot.
3. Over eight feet fabric height:
 - a. 3.50 inches OD pipe; weight of 7.58 pounds per linear foot.

F. Gate Posts: Provide gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

1. Up to six feet wide:
 - a. 2.875 inches OD pipe weighing 5.79 pounds per linear foot.
2. Over six feet wide and up to 13 feet wide:
 - a. Four inches OD pipe weighing 9.11 pounds per linear foot.
3. Over 13 feet wide and up to 18 feet wide:
 - a. 6.625 inches OD pipe weighing 18.97 pounds per linear foot.
4. Over 18 feet wide:
 - a. 8.625 inches OD pipe weighing 28.55 pounds per linear foot.

G. Top Rail: Provide top rails, unless otherwise shown or indicated, conforming to the following:

1. 1.900 inch OD pipe weighing 2.72 pounds per linear foot.

2. Provide in manufacturer's longest lengths, with expansion-type coupling 0.051-inch thick rail sleeves, approximately seven inches long, for each joint.
 3. Provide means for attaching top rail securely to each gate, corner, pull, and end post.
- H. Roll-Formed Steel: Provide rolled steel shapes produced from structural-quality steel conforming to ASTM A1011, Grade 45, with minimum yield strength of 45,000 pounds psi. Protective coating system shall conform to ASTM F1043, as specified.
- I. Post Brace Assembly: Provide bracing assemblies at end and gate posts, and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric.
1. Use 1.900-inch OD pipe weighing 2.72 pounds per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckle for diagonal truss.

2.4 GATES

- A. Swing gates shall comply with ASTM F900.
- B. Sliding gates shall comply with ASTM F1184.
- C. Gate hinges shall be double clamping offset type. To hold gate in the open or closed positions, provide each gate frame with a keeper that automatically engages gate shoe set in concrete. Gates shall have drop latch with provision for padlock.
1. Gate Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, 180-degree offset heavy-industrial hinges, 1.5 pair per leaf.
 2. Latch: Forked-type or plunger bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
 3. Keeper: Provide a gate keeper for vehicle gates that automatically engages gate leaf and holds gate leaf in open position until manually released.
- D. Padlocks: Provide each gate with heavy-duty bronze padlock and shackle chain as follows:
1. Product and Manufacturer: Provide one of the following:
 - a. No. 160DHM with 1 1/32-inch marine brass shackle by Master Lock Company.
 - b. Or equal.
 2. Provide three keys for each padlock. Where more than one gate is required for same enclosure, padlocks shall be keyed identically.
- E. Provide gate frames with intermediate horizontal rails. Gate frames shall be welded construction and shall be galvanized after fabrication. Provide single gates six feet or greater in width, and double gates 12 feet or greater in width, with diagonal bracing in one direction, extending from top to bottom rail.

- F. Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete and designed to engage a center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, using one padlock for locking both gate leaves.
- G. Fabricate gate perimeter frames of tubular members. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space so that frame members are not more than eight feet apart. Fabricate as follows:
 - 1. Up to six feet high, or leaf width of eight feet or less:
 - a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.
 - 2. Over six feet high, or leaf width exceeding eight feet:
 - a. 1.900-inch OD pipe weighing 2.72 pounds per linear foot.
- H. Assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. Use same fabric as provided for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15 inches on centers. Attach hardware with rivets or by other means that will provide security against removal and breakage.
- I. Install diagonal cross-bracing on gates consisting of 1/2-inch diameter adjustable length truss rods provided with turnbuckles to ensure frame rigidity without sag or twist.
- J. Sliding Gates: Provide manufacturer's heavy-duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories as required.

2.5 AUXILIARY FENCING MATERIALS AND ACCESSORIES

- A. Wire Ties:
 - 1. For tying fabric to line posts, use nine-gage, aluminum alloy 1100-H4, spaced 12 inches on centers.
 - 2. For tying fabric to rails and braces, use nine-gage, aluminum alloy 1100-H4, spaced two feet on centers.
 - 3. For tying fabric to tension wire, use 11-gage, aluminum alloy 1100-H4, spaced two feet on centers.
- B. Tension Wire: Provide tension wire consisting of aluminized, seven-gage, coiled spring steel wire coated with 0.40-ounces of aluminum per square foot of wire surface, minimum, in compliance with ASTM F1664.
 - 1. Locate at bottom of fabric only.
- C. Barbed Wire Supporting Arms: Pressed steel for three rows of barbed wire attached to each arm, complete with provisions for anchorage to posts. Supporting arms shall be integral with post-top weather cap. Provide following type:

1. Single 45-degree arm, one for each post.
- D. Barbed Wire: Commercial quality steel, two-strand, 11-gage line wire with 14-gage, four-point twisted aluminum alloy barbs spaced five inches on centers.
- E. Post Caps: Pressed steel, wrought iron, or cast aluminum alloy, designed as weather-tight closure cap, for tubular posts. Provide one cap for each post unless equal protection is afforded by combination post-top cap and barbed wire supporting arm, where barbed wire is required.
1. Provide caps with openings to allow through-passage of top rail.
 2. Provide cone-type caps for terminal posts and loop-type caps for line posts.
- F. Stretcher Bars: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16-inch by 3/4-inch. Provide one stretcher bar for each gate and end-post, and two for each corner- and pull-post, except where fabric is integrally woven into the post.
- G. Stretcher Bar Bands: Pressed steel, galvanized, 0.078-inch to 0.108-inch thick depending on post diameter, spaced not greater than 15 inches on centers to secure stretcher bars to end-, corner-, pull-, and gate-posts.
1. Bands may also be used with special fittings for securing rails to end-, corner-, pull-, and gate-posts.
- H. Truss Rods: Steel rods, 3/8-inch diameter, merchant quality with turnbuckle.
- I. Concrete: In accordance with Section 03 30 05, Concrete.

2.6 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6-gage and smaller, stranded wire for No. 4-gage and larger.
1. Material Above Finished Grade: Copper.
 2. Material On or Below Finished Grade: Copper.
 3. Bonding Jumpers: Braided copper tape, one inch wide, woven of No. 30-gage bare copper wire, terminated with copper ferrules.
- B. Connectors and Ground Rods: As listed in UL 467.
1. Connectors for Below-Grade Use: Exothermic welded type.
 2. Ground Rods: Copper-clad steel.
 - a. Size: 5/8-inch by eight feet.

2.7 FINISHING

- A. Chain-Link Fence Fabric:
1. Aluminized finish with not less than 0.40 ounces aluminum per square foot, complying with ASTM A491, Class II.

- B. Framework and Appurtenances: Provide the following finishes for steel framework, auxiliary system components, and miscellaneous accessories:
 - 1. Galvanizing: Zinc for galvanizing shall be of High Grade or Special High Grade conforming to ASTM B6 with maximum aluminum content of 0.01 percent. Galvanize metal using hot-dip process in accordance with the following:
 - a. Structural Iron and Steel Shapes: ASTM A123
 - b. Rolled-Form Sheet Steel: ASTM A653
 - c. Hardware and Accessories: ASTM A153
 - d. Fittings: ASTM F626
 - e. Pipe: ASTM A53
 - 2. Provide minimum weights of zinc as follows:
 - a. Pipe: 1.8-ounces of zinc per square foot. Apply Type A coating both inside and outside according to ASTM F1043, as determined by ASTM A90.
 - b. Rolled-Form Sheet Steel: 4.0-ounces of zinc per square foot of surface area.
 - c. Hardware and Accessories: Zinc weights in compliance with Table 1 of ASTM A153.
- C. Welded Joints:
 - 1. Repair zinc coatings at welded joints by applying zinc-rich paint, as specified in Section 09 91 00, Painting, and ASTM A780.

2.8 SOURCE QUALITY CONTROL

- A. Fabrication Tolerances:
 - 1. Fabric, posts, rails, and other supports shall be straight or uniformly curved to provide the profiles shown, to dimensional tolerance of 1/16-inch in 10 feet without warp or rack in the finished Work.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be erected and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 ERECTION

- A. Comply with CLFMI Step-by-Step Installation Guide and ASTM F567. Do not begin installation and erection of fencing until final grading is completed.
- B. Excavation: Drill holes of diameters specified, for post footings in firm, undisturbed or compacted soil.

1. For posts set in cast-in-place concrete, provide hole diameters dug or drilled a minimum of four times the largest cross section of post.
 - a. Unless otherwise shown or indicated, excavate hole depths approximately three inches lower than bottom of post, with bottom of posts set not less than two feet below the surface of finished grade when in firm, undisturbed soil, plus an additional three inches for each foot increase in the fence height over four feet.
 2. Spread soil from excavations uniformly adjacent to fence line, or on adjacent areas of the Site, as directed by Engineer.
 3. When solid rock is encountered at ground surface, drill into rock at least 12 inches for line-posts and at least 1.5 feet for end-, pull-, corner-, and gate-posts. Drill hole at least one inch greater diameter than largest dimension of post to be placed.
 - a. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed the minimum depths specified above for rock encountered at ground surface.
- C. Setting Posts: Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
1. Center and align posts in holes 3-inches above bottom of excavation.
 2. Posts shall be set in concrete footings, except as otherwise shown or specified. Place concrete around posts in continuous pour, and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 3. Extend concrete to two inches above ground surface, or to two inches below ground surface if cover of sod, bituminous asphalt paving, or other material is shown or indicated to conceal concrete. Crown to shed water away from posts.
 4. Extend footings for gate posts to underside of bottom hinge. Set keeps, stops, sleeves, and other accessories into concrete as required.
 5. Keep exposed concrete surfaces moist for at least seven days after placement, or cure with membrane curing materials, or other acceptable curing method.
- D. Concrete Strength: Allow concrete to attain at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than seven days after placement, before installing rails, tension wires, barbed wire, or chain-link fabric.
1. Do not stretch and tension fabric and wires, and do not hang gates, until concrete has attained its full design strength.
- E. Posts and Rails:
1. Line Posts: Set posts in cast-in-place concrete footings as specified, spaced not more than ten feet on centers. Provide caps on top of each post to exclude moisture and to receive top rail, unless equal protection is afforded by combination post-top cap and barbed wire supporting arm, where barbed wire is required.
 2. Top Rails: Run rail continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as

recommended by fencing manufacturer to form continuous rail between terminal posts.

3. Brace Assemblies: Install braces so posts are plumb when diagonal rod are under proper tension. Install brace assemblies at end-posts and at both sides of corner- and pull-post panels. Panels adjacent to gates shall have intermediate horizontal rails and diagonal bracing. Diagonal bracing shall run from center of first line-post to bottom of terminal-post.

F. Chain-Link Fabric:

1. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released. Fasten to terminal posts and gate posts with tension bars threaded through mesh and secured with tension bands at maximum intervals of 14 inches.
2. Tie to line-posts, gate frames and top and bottom rails with tie wires spaced at maximum 12 inches on posts and two feet on rails.
3. Connect tension bars to posts and frames by means of adjustable bolts and bands spaced not more than 14 inches apart.
4. Leave approximately two inches between finish ground surface and bottom selvage, except where bottom of fabric extends into concrete.
5. Join roll of chain-link fabric by weaving a single picket into the ends of roll to form continuous mesh.

G. Tension Wire:

1. Stretch tension wire taut and free of sag, from end to end of each stretch of fence and position at a height that will enable the wire to be fastened to chain-link fabric by securing within the top 12 inches of chain-link fabric.
2. Fasten bottom tension wire within bottom six inches of chain-link fabric.
3. Tie tension wire to each post with not less than six-gage galvanized wire.

H. Stretcher Bars: Thread through or clamp to fabric four inches on centers, and secure to posts with metal bands spaced 15 inches on centers.

I. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as shown on approved Shop Drawings. Adjust hardware for smooth operation and lubricate where necessary.

J. Tie Wires: Use U-shaped wires conforming to diameter of pipe. Clasp pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons and clothing.

K. Fasteners: Install nuts for tension band and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.3 GROUNDING AND BONDING

A. Fence Grounding: Provide at maximum intervals of 1,500 feet, except as follows:

1. Ground fencing within 100 feet of buildings, structures, walkways, and roadways at maximum intervals of 750 feet.
 - a. Gates and Other Fence Openings: Ground fence on each side of opening.
 - 1) Bond metal gates to gate-posts.
 - 2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2-gage wire and bury wire at least 1.5 feet below finished ground surface.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fencing at location of crossing and at maximum distance of 150 feet on each side of crossing.
- C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2, unless otherwise shown or indicated.
- D. Grounding Method: At each grounding location, drive ground rod vertically until the top is six inches below finished ground surface. Connect rod to fence with No. 6-gage conductor. Connect conductor to each fence component at grounding location, including the following:
 1. Each Barbed Wire Strand: Make grounding connections to barbed wire with wire-to-wire connectors designed for this purpose.
- E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- F. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Provide connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 2. Make connections with clean, bare metal at points of contact.
 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- G. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor.

3.4 FIELD QUALITY CONTROL

- A. Site Tests:

1. Ground-Resistance Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing.
2. Ground-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure ground resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by two-point method in accordance with IEEE 81.
3. Desired Maximum Grounding Resistance Value: 25 ohms.
4. Excessive Ground Resistance: If resistance to ground exceeds desired value, notify Engineer promptly. Include recommendations to reduce ground resistance and proposal to accomplish the recommendations.
5. Report: Prepare and submit test reports, certified by testing agency, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results.

3.5 ADJUSTMENT AND CLEANING

- A. Repair coatings damaged in the shop or at the Site by recoating with manufacturer's recommended repair compound, applied in accordance with manufacturer's directions. Repair hot-dip galvanized coatings in accordance with ASTM A780.
- B. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, and malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- C. Lubricate operating equipment and clean exposed surfaces.
- D. Repair and replace broken or bent components.

+ + END OF SECTION + +

SECTION 32 92 00

LAWNS AND MEADOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install all lawns and meadows.
2. Extent of lawns and meadows is shown.
3. Types of products required include the following.
 - a. Topsoil.
 - b. Lawn grass seed.
 - c. Inorganic soil amendments.
 - d. Organic soil amendments.
 - e. Fertilizers.
 - f. Mulches.
 - g. Erosion-control materials.
 - h. Accessories.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with, or before, lawns and meadows.
2. Notify other contractors in advance of the planting of lawns and meadows to provide them with sufficient time for the installation of items that must be installed with, or before, lawns and meadows.

C. Related Sections:

1. Section 32 31 00, Fences.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. Association of Official Analytic Chemists, (AOAC).
 - a. Official Methods of Analysis of AOAC International.
2. Association of Official Seed Analysts, (AOSA).
 - a. Journal of Seed Technology; Rules for Testing Seeds.
3. American Society of Agronomy, (ASA).
 - a. Reference No. 1 - Methods of Soils Analysis, Soil Science Society of America, Incorporated.
4. American Society for Testing and Materials, (ASTM).
 - a. ASTM B 221, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

- b. ASTM C 602, Specification for Agricultural Liming Materials.
- c. ASTM D 75, Practice for Sampling Aggregates.
- d. ASTM D 422, Test Method for Particle Size Analysis of Soil.
- e. ASTM D 977, Specification for Emulsified Asphalt.
- f. ASTM D 2487, Practice for Classification of Soils for Engineering Purposes (United Soil Classification System).
- g. ASTM D 5268, Specification for Topsoil Used for Landscape Purposes.
- h. ASTM E 329, Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- i. ASTM E 548, Guide for General Criteria Used for Evaluating Laboratory Competence.

1.3 DEFINITIONS

- A. The term “finish grade” shall be used to describe the finished surface elevation of planting soil.
- B. The term “manufactured topsoil” shall be used to describe soil produced off-Site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil acceptable as a component of loam.
- C. The term “loam” shall be used to describe topsoil that has been mixed with additional organic and inorganic additives, as specified.
- D. The term “percentage pure live seed” shall be defined as the percent (%) purity multiplied by percent (%) germination divided by 100 to equal the percent pure live seed (PLS) and shall be calculated for all seed lots using each seed lots own unique purity and germination test results. A PLS pound shall be defined as the bulk weight of seed required to equal one pound of 100 percent pure, germinated seed.
- E. The term “subgrade” shall be used to describe the surface of subsoil remaining after completing excavation; or the top surface of a fill or backfill immediately beneath topsoil and which has not been tested for acceptable use as topsoil.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Engage a single landscape installer skilled, trained and with successful and documented experience in the planting of lawns and meadows and with specific skill and successful experience in the installation of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work. Submit names and qualifications to Engineer along with the following information on a minimum of three successful projects:
 - a. Names and telephone numbers of owner, architects or engineers responsible for projects.

- b. Approximate contract cost of the lawns and meadows.
 - c. Amount of area installed.
 - 2. Installer's Site Supervisor: Require installer to maintain an experienced full-time landscape supervisor on-Site during the time of preparation for, and planting of, lawns and meadows. Supervisor shall have achieved landscape or horticultural certification acceptable to governing authorities having jurisdiction at the Site.
 - 3. Ratio of laborers to certified landscape supervisors shall not exceed 12 to one. Certified landscape supervisor shall be on-Site throughout the day-to-day performance of the Work of this Section.
 - 4. Application of herbicides, chemicals and insecticides shall be done by personnel licensed to perform such applications by governing authorities having jurisdiction at the Site and in accordance with each manufacturer's instructions provided on each product label.
- B. Soil-Testing Laboratory Qualifications:
- 1. An independent laboratory, recognized by governing authorities having jurisdiction at the Site, with the experience and capability to conduct testing indicated and that specializes in types of soil tests to be performed.
 - 2. To qualify for approval, an independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work, in accordance with ASTM E 329 and as documented according to ASTM E 548.
- C. References: Comply with the applicable requirements referenced in Section 01 42 00, References.
- D. Soil Analysis: Furnish report of soil analysis to Engineer, prepared by a qualified soil-testing laboratory, stating percentages of organic matter; mechanical gradation of sand, silt, and clay content in compliance with ASTM D 422; cation exchange capacity; sodium absorption ratio; deleterious materials content; pH; and mineral and plant-nutrient content of soil. Chemical analysis shall include tests for percentages of nitrate nitrogen, ammonium nitrogen, phosphorus, potassium, calcium, iron, manganese, copper, zinc, extractable aluminum, and total soluble salts.
- 1. Existing On-Site Soil:
 - a. Separate soil stockpiled and proposed for use as topsoil for lawns and meadows into 1000 cubic yard piles and label with a numbering system used to reference all soil samples and test results.
 - b. Obtain a one cubic foot representative sample for each 1000 cubic yards of soil stockpiled on-Site proposed for use as topsoil for lawns and meadows, in compliance with ASTM D 75 and Appendixes, for securing samples from stockpiles.
 - c. Place samples taken from each stockpile, into separate clean, new and previously unused, containers and mix thoroughly. Maintain separation and legible labeling of each sample taken from each

- stockpile, throughout the process of mixing, drying and delivering to soil analysis laboratory. Label samples on outside of container.
- d. Take one cup of soil from each container and allow to dry at room temperature. Once dry, place each one-cup sample in a separate, accurately labeled, new and previously unused one-cup sized plastic container, seal tightly and deliver to soil testing laboratory.
 - e. Report suitability of soil as a topsoil component for lawn and meadow plant growth. State recommended quantities of nitrogen, phosphorus, secondary and micronutrients, potash and soil amendments to be added to produce satisfactory topsoils. Include calculations, types of fertilizer and recommendations for application rates in either gallons or pounds per cubic foot of soil.
 - f. In addition, all on-Site soil that will be used as topsoil shall be provided with additional compost and peat moss amendments specified, whether or not testing indicates positive need for such amendments, for such material to be used as loam.
2. Manufactured Imported Topsoil:
- a. Test each 1000 cubic yards of manufactured topsoil at the proposed source. In addition, after Engineer's approval of manufactured topsoil based on results and recommendations of soil testing reports, test each 1000 cubic yards of manufactured topsoil that is delivered to the Site for conformance to results and recommended modifications of approved soil test reports. Manufactured topsoil that differs from proposed source material, after modification according to recommendations of soil test reports, shall be rejected for use in the Work.
 - b. Obtain a one cubic foot representative sample for each 1000 cubic yards of manufactured topsoil proposed for lawn and meadow Work, in compliance with ASTM D 75 and Appendixes, for securing samples from stockpiles.
 - c. Place samples taken from each stockpile into separate clean, new and previously unused, containers and mix thoroughly. Maintain separation and legible labeling of each sample, taken from each stockpile, throughout the process of mixing, drying and delivering to soil analysis laboratory. Label samples on outside of container.
 - d. Take one cup of topsoil from each container and allow to dry at room temperature. Once dry, place each one-cup sample in a separate, accurately labeled, new and previously unused one-cup sized plastic container, seal tightly and deliver to soil testing laboratory.
 - e. Report suitability of manufactured topsoil as a component for lawn and meadow plant growth. State recommended quantities of nitrogen, phosphorus, secondary and micronutrients, potash and soil amendments to be added to produce satisfactory manufactured topsoil. Include calculations, types of fertilizer and recommendations for application rates in either gallons or pounds per cubic foot of manufactured topsoil.

- f. Organic component of manufactured topsoil shall be obtained from compost and peat moss amendments specified, for such material to be used as loam.
- E. Source Quality Control:
 - 1. Analysis and Standards: Package all products with manufacturer's certified analysis performed in accordance with methods established by AOAC, wherever applicable, or as specified.
 - 2. Provide manufactured imported topsoil from a commercial processing facility specializing in the manufacture of topsoil.
 - 3. Seed that has been stored at temperatures, or under conditions not recommended by the seed supplier, or has become wet, moldy, or otherwise damaged, shall not be acceptable. The PLS for each seed lot shall be 75 percent, minimum.
 - 4. Certify that all seed has been stored under conditions recommended by the seed supplier and has not been subjected to conditions damaging to PLS percentages.
 - 5. Seed may be mixed by an approved method on-Site or at the seed supplier's facilities. If the seed is mixed on-Site, each variety shall be delivered in the original containers and shall bear the supplier's certified analysis. Where seed is mixed by the seed supplier, provide Engineer with the seed supplier's certified statement as to the composition of the mixture.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Schedule for lawn planting showing anticipated planting dates for each type of Work.
 - 2. Product Data:
 - a. Manufacturer's product data, specifications and installation instructions for all required materials.
 - b. Composition and analysis of commercial fertilizers and all purchase receipts showing the total quantity actually purchased for this Project.
 - c. Proportions of each component contained in hydro seed mixture. Identify number of pounds of each component required for each 100 gallons of water. Include the number of square feet of lawn, grass meadow or wildflower meadow mixture that can be installed with each full tank of hydro seed mixture.
 - d. PLS for each type of seed and each seed lot. Include bulk weight of seed required to equal one pound of 100 percent pure, germinated seed.
 - 3. Samples:
 - a. Submit 12-inch by 12-inch sheet of erosion control fabric with manufacturer's selections of standard biodegradable filler papers, and yarns.

- B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Certification of Grass and Wildflower Seed: For each grass-seed monostand and seed mixture, furnish seed supplier's certification stating the botanical and common name, and percentage by weight of each species and variety, and percentage of purity, germination and weed seed. Include the year of production and date of packaging. Certify that seed has been stored in compliance with all recommendations of the seed supplier.
 2. Test Reports: Submit the following:
 - a. Soil analysis reports for existing soil and imported manufactured topsoil, as specified. Include recommendations for remediating existing soil into acceptable topsoil.
 3. Qualifications Data: Submit qualifications data for the following:
 - a. Landscape installer.
 - b. Landscape supervisor.
 - c. Testing agency.
 4. Source Quality Control Submittals
 - a. Written statement providing the location from which manufactured topsoil is to be obtained and the names and addresses of the suppliers.
- C. Closeout Submittals: Submit the following:
1. Operations and Maintenance Data:
 - a. Submit recommended procedures to be established by Owner for the maintenance of lawns and meadows for one full year. Submit prior to expiration of required maintenance period.
 2. Warranty Documentation:
 - a. Submit written warranty, signed by Contractor and landscape installer, as specified.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
1. Do not deliver seed until Site conditions are ready for installation.
 2. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery.
 3. Deliver seed in undamaged, original containers, sealed by the supplier and indicating compliance with approved Shop Drawings.
 4. Inspect lawn materials upon arrival at Site. Immediately and permanently remove unacceptable materials from Site.
- B. Storage of Materials:
1. Store and cover materials to prevent deterioration. Remove packaged materials that become wet or show deterioration or water marks from the Site.
 2. Seed that becomes wet, moldy or damaged during the time of storage on-Site or that has been damaged during transit is not acceptable.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Proceed with and complete lawn and meadow planting as rapidly as portions of the Site become available, working within the seasonal limitations for each type of lawn, grass and wildflower planting required.
 - 2. Proceed with planting only when current and forecasted weather conditions are favorable to successful planting and establishment of lawns and meadows.
 - a. Do not spread seed when wind velocity exceeds five miles per hour.
 - b. Do not plant when drought, or excessive moisture, or other unsatisfactory conditions prevail.
 - 3. Herbicides, chemicals and insecticides shall not be used on areas bordering wetlands.
- B. Scheduling:
 - 1. Coordinate planting with specified extended service periods to provide required service from date of Substantial Completion. Plant during one of the following periods:
 - a. Spring Planting: March 15 to June 1.
 - b. Fall Planting: September 1 to October 30.
 - 2. Do not begin lawn and meadow planting until water, acceptable for use and adequate in supply, is available on-Site and can be successfully transported to the areas of Work. Coordinate provision of adequate and acceptable water supply with Project Schedule.
 - 3. Do not proceed with installation of loam until all subgrade utility services have been installed, are operating successfully and have been approved by Engineer.

1.8 WARRANTY

- A. General Warranty: The special warranties specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents.
- B. Special Warranties: Warranty lawns and meadows through the specified service period of 6 months.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. All soil accepted as topsoil, whether obtained from on-Site or off-Site sources, shall comply with specified topsoil analysis.
 - 2. Provide fertile, friable, natural loam, surface soil, capable of sustaining vigorous plant growth; free of any admixture of subsoil, clods of hard earth,

plants or roots, sticks, stones larger than 1-inch in diameter, or other extraneous material harmful to plant growth, in compliance with ASTM D 5268. Provide topsoil with the following analysis:

- a. 3/4-inch mesh: 100 percent passing.
 - b. No. 4-sieve: 90 to 100 percent passing.
 - c. No. 200-sieve: 0 to 10 percent passing.
 - d. Clay content of material passing No. 200-sieve not greater than 60 percent, as determined by hydrometer tests.
 - e. pH-adjusted with ferrous sulphate or ground limestone to provide pH 5.5 to pH 7.0 at time of installation of lawns, grass and meadow areas, unless particular species of grass or wildflower stand requires a different pH to meet its growing needs.
 - f. Electrical conductivity of a 1:2 soil-water suspension shall not exceed 1.0 milliohm per centimeter and with less than 200 parts per million of extractable aluminum.
 - g. Cation Exchange Capacity: 5, minimum.
 - h. Organic content not less than five percent, as determined by ignition loss of oven-dried samples passing No. 10-sieve (Muffle Furnace Temperature: 110 plus or minus five degrees C for eight hours).
 - i. Free of pests and pest larvae.
3. Topsoil Source: Reuse surface soil stockpiled on-Site, where possible. Verify suitability of stockpiled surface soil to produce topsoil, as specified. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
- a. Supplement acceptable on-Site soil with manufactured topsoil from off-Site sources, when quantities available on-Site are insufficient to complete the Work.

B. Lawn Grass Seed:

1. Lawn Grass Seed Mixture: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by AOSA. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, specified.
2. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 80 percent pure seed, and not more than 0.25 percent weed seed by weight:
 - a. Full Sun: Kentucky Bluegrass (*Poa pratensis*), a minimum of three cultivars.

C. Inorganic Soil Amendments:

1. Limestone: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
 - a. Class: Class T, with a minimum 99 percent passing through No. 8-sieve and a minimum 75 percent passing through No. 60-sieve.
2. Iron Sulfate: Commercial-grade acidulant, recommended for use on acid-loving plants. Provide granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

3. Perlite: Agricultural-grade, expanded pumice.
4. Agricultural Gypsum: Commercial-grade and finely ground, containing a minimum of 90 percent calcium sulfate.
5. Grit Aggregate: Commercial-grade filter sand consisting of hard, durable rounded grains of quartz or other rock that do not compact to a solid mass when wet, with a pH in the range required for topsoil. Provide clean, washed, natural or manufactured aggregate, free of toxic materials, salt and other chemical contamination.

D. Organic Soil Amendments:

1. Compost: Well-composted, stable, weed-free organic matter, produced by the aerobic decomposition of organic residues; pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch screen; soluble salt content of 5 to 10 decisiemens/meter; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - a. Organic Matter Content: 50 to 60 percent of dry weight.
 - b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
2. Peat: Partially decomposed stems and leaves of several species of sphagnum moss; finely divided or granular texture. Supply shredded material, free from lumps, wood, roots, stones, decomposed colloidal residue and other extraneous foreign matter, capable of passing through a 1/2-inch screen, which can easily be incorporated with the soil. Supply material, which has been conditioned in storage piles after excavation for at least six months, including one freezing and thawing period. Supply peat humus with the following analysis:
 - a. Not less than 90 percent organic matter by weight on an oven-dry basis.
 - b. pH range of 3.4 to 4.8.
 - c. Moisture content 35 percent at time of incorporation into soil.
 - d. Water absorbing ability 150 percent to 350 percent by weight.
3. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 - a. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 pounds of ammonium nitrate or 0.25 pounds of ammonium sulfate per cubic foot of loose sawdust or ground bark.
4. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

E. Fertilizers:

1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of four percent nitrogen and 20 percent phosphoric acid.
2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports.
4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

F. Mulches:

1. Straw Mulch: Provide air-dry, clean, mildew- and certified seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
2. Peat Mulch: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.
3. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch screen; soluble salt content of 5 to 10 decisiemens/meter; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - a. Organic Matter Content: 50 to 60 percent of dry weight.
 - b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
4. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
5. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
6. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

G. Erosion-Control Materials:

1. Erosion-Control Blankets: 100 percent biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended 6-inches long steel wire staples.
2. Erosion-Control Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 pounds per cubic yard, with 50 to 65 percent open area. Include manufacturer's recommended 6-inches long steel wire staples.

H. Accessories:

1. Provide herbicides, chemicals and insecticides as needed for disease, fungus or pest control. All herbicides, chemicals and insecticides shall be bear approval labels indicating they are approved by the United States Department of Agriculture for the intended uses and application rates.

2. Post Emergent Crab Grass and Plantain Chemical: Provide recommended post emergent crab grass and plantain control throughout the maintenance period to ensure germinated and established lawns free of crab grass and other undesirable grasses and forbs.
 3. Steel Edging: Standard commercial steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
 - a. Edging Size: 1/4-inch wide by 5-inches deep.
 - b. Stakes: Tapered steel, a minimum of 15-inches long.
 - c. Accessories: Standard tapered ends, corners, and splicers.
 - d. Finish: Zinc-coated.
 - e. Paint Color: Black.
- I. Water: Acceptable for lawn and meadow application and containing no material harmful to plant growth and establishment.

2.2 LOAM MIXES

- A. Follow recommendations of soil-testing laboratory for modifying on-Site soil and manufactured soil, for use as topsoil.
- B. On-Site soil and manufactured soil that has been provided with all inorganic soil amendments and fertilizers recommended by soil-testing laboratory, and acceptable for use as topsoil, shall be mixed with an additional organic soil amendment mix in a ratio of two parts topsoil to one part organic soil amendment mix, by volume.
1. Prepare soil amendment mix by combining 40 percent compost, 40 percent peat moss, ten percent wood derivatives, five percent well-rotted manure and five percent grit aggregate, by volume.
- C. Loam: Thoroughly blend topsoil with organic soil amendment mix and use as planting media for all lawn and meadow Work.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Contractor shall examine the areas and conditions under which lawn and meadow Work is to be performed, and notify Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 PREPARATION

- A. Thoroughly blend and mix loam before spreading. Incorporate fertilizers, and ground limestone or acidulant, after spreading, as specified, and at rates recommended by soil-testing laboratory.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding overspray.
- C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- D. Perform percolation tests on existing subgrade and placed fills prior to fine grading.
 - 1. Perform percolation testing of subgrades and placed fills to determine whether or not the subgrade will drain properly. Perform percolation tests in accordance with the following procedure:
 - a. Dig a hole in the subgrade that is 4-inches in diameter and 12-inches deep.
 - b. Fill the hole with water and wait for the water to completely drain from the hole.
 - c. Immediately refill the hole with water and measure the rate of fall in the water level.
 - 2. In the event that water drains at a rate less than 1-inch in one hour, excavate soil to a minimum depth of 24-inches, and deeper, as necessary to break the compaction. Backfill, recompact and retest each area so prepared to confirm drainage rates exceed one inch in one hour.
 - 3. Perform minimum of one soil percolation test for every 10,000 square feet of lawn and meadow area.
- E. Excavate or fill subgrade, as required, to bring subgrade to elevations shown. Maintain all angles of repose. Confirm that subgrade is at proper elevations and that no further earthwork is required to bring the subgrade to proper elevations. Provide subgrade elevations that slope parallel to finished grade and towards subsurface drains shown.
- F. Remove all construction debris, trash, rubble and all extraneous materials from subgrade. In the event that fuels, oils, concrete washout or other material harmful to plant growth or germination have been spilled into the subgrade, excavate the subgrade sufficiently to remove all such harmful materials and fill with approved fill, compacted to the required subgrade compaction level.

3.3 FINE GRADING

- A. Immediately prior to dumping and spreading loam, clean subgrade of all stones greater than 2-inches and all other extraneous matter. Remove all such material from Site. Notify Engineer that subgrade has been cleaned, and obtain approval prior to spreading loam.

- B. Do not attempt to spread excessively wet, muddy or frozen loam. Do not spread loam more than five days before seeding or planting.
- C. Spread loam to a depth of 6-inches but not less than required to meet finish grades after light rolling and natural settlement.
 - 1. Spread approximately one-half the thickness of required loam depth. After spreading loam, rototill, disk or harrow loam and subgrade to bring top 2-inches of subgrade upward into loam layer, so that there is a transitional layer between loam and subgrade.
 - 2. Spread remainder of loam to required finish grades.
 - 3. Compact each lift sufficiently to reduce settling, but not enough to prevent the movement of water and feeder roots through loam. After compaction spread loam should offer firm, even resistance when a soil sampling tube is inserted.
 - 4. Phase the placement of the final lift so that wheeled vehicles do not have to travel over areas where final lifts are already in-place.
 - 5. Spread and compact to a smooth, uniform surface plane, to within plus or minus 1/2-inch of finish elevations. Roll and rake and remove all ridges, and fill depressions, as required. Remove all stones larger than 1-inch in any dimension and all sticks, roots, trash and other extraneous matter.
 - 6. Perform percolation tests as for subgrades, except limit depth of holes to 2/3 the depth of loam layer.
- D. Spread ground limestone or acidulant and fertilizer, as specified. Mix ground limestone with dry loam before spreading fertilizer and work lightly into the top 4-inches of loam by harrowing or tilling at least three days before applying commercial fertilizers.
- E. Grade planting areas to smooth, even surface with loose, uniformly fine texture. Remove all stones and extraneous material in excess of 1-inch diameter. Roll, rake and remove ridges and fill depressions, as required to meet finish grades.
- F. Moisten prepared areas before seeding, sodding, sprigging or plugging. Water thoroughly and allow surface moisture to dry before planting. Do not create a muddy loam condition.
- G. Prior to seeding or planting, restore loam to specified condition, if eroded or otherwise disturbed.

3.4 CONVENTIONAL SEEDING

- A. General: Maintain grade stakes until removal is mutually agreed upon by all parties concerned.
- B. Rake or harrow all seedbeds immediately prior to seeding to produce a rough, grooved surface, no deeper than 1-inch. Seed only when seedbed is in a friable condition and not muddy or hard.

- C. Sow seed using a spreader or seeding machine.
- D. Distribute seed evenly over entire area by sowing equal quantity in two directions at right angles to each other.
- E. Sow lawn grass seed mixture at the rate of not less than eight-pounds for every 1000 square feet.
- F. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm the seedbed in one operation. In areas inaccessible to cultipacker:
 - 1. Rake the seed lightly into top 1/8-inch of loam, roll in two directions with a water ballast roller, weighing not less than 100 pounds per linear foot.
 - 2. Take care during raking that seed is not raked from one spot to another.
 - 3. Protect seeded areas against erosion by spreading specified mulch after completion of seeding operations.
 - a. Protect seeded areas against hot, dry weather or drying winds by applying peat moss mulch not more than 24 hours after completion of seeding operations. Presoak and scatter evenly to a depth of from 1/8-inch to 3/16-inches thick and roll to a smooth surface. Do not mound.
 - b. Spread straw mulch to form a continuous loose blanket not less than 1-1/2-inch deep over seeded areas at the approximately rate of two tons-per acre.
 - 1) Anchor mulch by spraying with asphalt emulsion at the rate of ten to 13-gallons per 1000 square feet.
 - 2) Place mulch with equipment that will blow or eject, by means of a constant air stream, controlled quantities of the mulch and asphalt in a uniform pattern over the specified area. If the mulch is excessively cut or broken, take measures to reduce the cutting or breakage. Introduce the asphalt into the air stream by means of a spray arranged so that it will partially coat the mulch with a spotty asphalt tack prior to the depositing of the mulch covering. Rate of application not less than 75-gallons per ton of mulch.
 - c. Protect seeded areas, with slopes exceeding one on six, by providing erosion-control fiber mesh and where slopes exceed one on four, by providing erosion-control blankets. Install erosion-control materials according to manufacturer's written instructions and as follows:
 - 1) Vertically down slope without stretching fabric.
 - 2) Install hold down staples three per square yard minimum in center of fabric or as required to hold and shape the fabric to the contours of the slope. Install hold down staples along edges and overlaps of fabric at 9 inches on centers minimum, or as required to hold and shape the fabric to the contours of the slope.
 - 3) Lap fabric 4-inches minimum and turn edges of fabric into 8-inch deep by 16-inch wide earth trench and fill trench with earth.

- G. Using a uniform fine spray, thoroughly and evenly water seeded areas. Provide adequate water to moisten seedbed to a depth of 2-inches.
 - 1. Repeat this process when peat mulch color lightens. Maintain all seedbeds in a uniformly moist condition, conducive to seed germination and plant establishment, as specified.
- H. Reseed areas that remain without mulch for longer than three days.
- I. Take precautions to prevent damage or staining of construction or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- J. Prevent foot or vehicular traffic, or the movement of equipment, over the mulched areas. Reseed areas damaged as a result of such activity.

3.5 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
- B. Mix slurry with asphalt-emulsion tackifier.
- C. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry application at a minimum rate of 500-pounds per acre dry weight, but not less than the rate required to obtain specified seed-sowing rate so that the seed comes into direct contact with loam.
- D. Apply slurry cover coat of fiber mulch at a rate of 1000-pounds per acre.

3.6 RECONDITIONING EXISTING LAWNS

- A. Recondition existing lawn damaged by Contractor's operations, including areas used for storage of materials or equipment and areas damaged by movement of vehicles. Recondition existing lawns and meadow areas where minor regrading is required.
- B. Recondition other existing lawn areas shown.
- C. Provide fertilizer, seed or sod and soil amendments, as specified for new lawn and meadow, and as required to provide satisfactorily reconditioned lawns and meadows. Provide new loam as required to fill low spots and meet new finish grades.
- D. Till stripped, bare, and compacted areas thoroughly to a depth of 12-inches.
- E. Remove diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing extraneous materials resulting from Contractor's operations including oil drippings, stone, gravel and other construction materials.

- F. In areas approved by Engineer, where substantial lawns remain (but are thin), mow, dethatch, core aerate and rake. Fill low spots, remove humps, cultivate soil, fertilize, and seed. Remove weeds before seeding or if extensive, apply selective chemical weed killers, as required. Apply a seedbed mulch, if required, to maintain moist condition.
- G. Water newly planted areas and keep moist until new lawns and meadows are established, as specified.

3.10 ACCEPTANCE CRITERIA FOR LAWNS

- A. Lawn Work will be considered acceptable when:
 - 1. Seeded Lawn: When a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 square feet and bare spots not exceeding 5-inches by 5-inches.

3.11 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris, created by lawn and meadow Work, from paved areas. Clean wheels of vehicles before leaving Site to avoid tracking soil and loam onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout extended service period and remove when service period ends. Treat, repair or replace damaged lawns and meadows.
- C. Take all precautions to ensure that hydroseed slurry is only placed on the areas designated. Completely clean any overspray, on areas not designated to receive slurry.

3.12 INSPECTION AND ACCEPTANCE

- A. Where lawns and meadows do not comply with specified acceptance criteria, reestablish lawns and meadows and continue extended service period until lawns and meadows comply with criteria for acceptance.

3.13 DEMONSTRATION

- A. Engage installer's Site supervisor to train and instruct Owner's personnel in the proper maintenance of lawns and meadows and procedures to be performed throughout the year for proper care and maintenance of lawn and meadows.
 - 1. Include instructions and training on reconditioning established lawns and meadow and sources of lawn and meadow materials.
 - 2. Schedule training with Owner, through Engineer, with at least seven days' advance notice.

- B. Review Operation and Maintenance information and be sure all instructions are clearly understood by Owner's personnel and are supplemented with additional information, clarifications and instructions, as required.
- C. Provide minimum of two, nonconsecutive, full days on-Site training time during day shift normal working hours.

+ + END OF SECTION + +

SECTION 33 05 05

BURIED PIPING INSTALLATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to install and test all buried piping, fittings, and specials. The Work includes the following:
 - a. All types and sizes of buried piping, except where buried piping installations are specified under other Sections or other contracts.
 - b. Unless otherwise shown or specified, this Section includes all buried piping Work required, beginning at the outside face of structures or structure foundations, including piping beneath structures, and extending away from structures.
 - c. Work on or affecting existing buried piping.
 - d. Installation of all jointing and gasket materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, cathodic protection, and other Work required for a complete, buried piping installation.
 - e. Supports, restraints, and thrust blocks.
 - f. Field quality control, including testing.
 - g. Cleaning and disinfecting.
 - h. Incorporation of valves, meters, and special items shown or specified into piping systems in accordance with the Contract Documents and as required.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before buried piping Work.
2. Coordinate with appropriate piping Sections of Division 40, Process Integration.
3. Notify other contractors in advance of installing buried piping to provide them with sufficient time for installing items included in their contracts to be installed with or before buried piping installation Work.

C. Related Sections:

1. Section 03 00 05, Concrete.
2. Section 09 91 00, Painting.
3. Section 31 23 05, Excavation and Fill.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM C924, Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Test Method.
2. ASTM D2321, Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
3. ASTM D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
4. ASTM F1417, Test Method for Installation Acceptance of Plastic Gravity Sewer Lines using Low-Pressure Air.
5. ANSI/AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
6. ANSI/AWWA C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.
7. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
8. ANSI/AWWA C651, Disinfecting Water Mains.
9. AWWA M23, PVC Pipe - Design and Installation.
10. AWWA M41, Ductile-Iron Pipe and Fittings.
11. ASCE 37, Design and Construction of Sanitary and Storm Sewers.
12. NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements and recommendations of authorities having jurisdiction over the Work, including.
 - a. Town of Clarkstown.
2. Obtain required permits for Work in roads, rights-of-way, railroads, and other areas of the Work.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Details of piping, specials, joints, harnessing and thrust blocks, and connections to piping, structures, equipment, and appurtenances.
2. Product Data:
 - a. Manufacturer's literature and specifications, as applicable, for products specified in this Section.
3. Testing Procedures:
 - a. Submit proposed testing procedures, methods, apparatus, and sequencing. Obtain Engineer's approval prior to commencing testing.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.
2. Field Quality Control Submittals:

- a. Results of each specified field quality control test.
- C. Closeout Submittals: Submit the following:
 - 1. Record Documentation:
 - a. Maintain accurate and up-to-date record documents showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work. Submittal shall show actual location of all piping Work and appurtenances at same scale as the Drawings.
 - b. Show piping with elevations referenced to Project datum and dimensions from permanent structures. For each horizontal bend in piping, include dimensions to at least three permanent structures, when possible. For straight runs of piping provide offset dimensions as required to document piping location.
 - c. Include profile drawings with buried piping record documents when the Contract Documents include piping profile drawings.
 - d. Conform to Section 01 78 39, Project Record Documents.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
 - 2. Upon delivery inspect pipe and appurtenances for cracking, gouging, chipping, denting, and other damage and immediately remove from Site and replace with acceptable material.
- B. Storage:
 - 1. Store materials to allow convenient access for inspection and identification. Store material off ground using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.
 - 2. Pipe and fittings other than PVC and CPVC may be stored outdoors without cover. Cover PVC and CPVC pipe and fittings stored outdoors.
- C. Handling:
 - 1. Handle pipe, fittings, specials, and accessories carefully in accordance with pipe manufacturer's recommendations. Do not drop or roll material off trucks. Do not drop, roll or skid piping.
 - 2. Avoid unnecessary handling of pipe.
 - 3. Keep pipe interiors free from dirt and foreign matter.
 - 4. Protect interior linings and exterior coatings of pipe and fittings from damage. Replace pipe and fittings with damaged lining regardless of cause of damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Piping materials are specified in the Buried Piping Schedule at end of this Section.

Piping materials shall conform to Specifications for each type of pipe and piping appurtenances in applicable Sections of Division 40, Process Integration.

B. General:

1. Pipe Markings:
 - a. Manufacturer shall cast or paint on each length of pipe and each fitting pipe material, diameter, and pressure or thickness class.

2.2 BURIED PIPING IDENTIFICATION

A. Polyethylene Underground Warning Tape for Metallic Pipelines:

1. Tracer tape shall be of inert, acid- and alkali-resistant, polyethylene, four mils thick, six inches wide, suitable for direct burial. Tape shall be capable of stretching to twice its original length.
2. Message shall read, "CAUTION [insert customized name of pipe service, i.e., "POTABLE WATER", "SANITARY SEWER", "CHLORINE GAS", or other service as appropriate, as indicated in the Buried Pipe Schedule at the end of this Section] PIPE BURIED BELOW", with bold letters approximately two inches high. Messages shall be printed at maximum intervals of two feet. Tape shall be custom colored the same as pipeline colors specified for associated pipe service in Section 09 91 00, Painting.
3. Manufacturer: Provide products of one of the following:
 - a. Brady Corporation
 - b. Seton Identification Products
 - c. Marking Services, Inc.
 - d. Or equal.

B. Detectable Underground Warning Tape for Non-Metallic Pipelines:

1. Tape shall be of inert, acid- and alkali-resistant, polyethylene, five mils thick, six inches wide, with aluminum backing, and have 15,000 psi tensile strength and 80 percent elongation capability. Tape shall be suitable for direct burial.
2. Message shall read, "CAUTION [insert customized name of pipe service, i.e., "POTABLE WATER", "SANITARY SEWER", "CHLORINE GAS", or other appropriate service, as indicated in the Buried Pipe Schedule at the end of this Section] PIPE BURIED BELOW" with bold letters approximately two inches high. Messages shall be printed at maximum intervals of two feet. Tape shall be custom colored the same as the pipeline colors as specified for the associated pipe service in Section 09 91 00, Painting.
3. Manufacturer: Provide products of one of the following:
 - a. Brady Corporation
 - b. Seton Identification Products
 - c. Marking Services, Inc.
 - d. Or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install piping as shown, specified, and as recommended by pipe and fittings manufacturer.
2. In event of conflict between manufacturer's recommendations and the Contract Documents, request interpretation from Engineer before proceeding.
3. Engineer will observe excavations and bedding prior to laying pipe by Contractor. Notify Engineer in advance of excavating, bedding, pipe laying, and backfilling operations.
4. Minimum cover over buried piping shall be four feet, unless otherwise shown or approved by Engineer.
5. Earthwork is specified in Section 31 23 05, Excavation and Fill.
6. Excavation in excess of that required or shown, and that is not authorized by Engineer shall be filled at Contractor's expense with granular material furnished, placed, and compacted in accordance with Section 31 23 05, Excavation and Fill.
7. Comply with NFPA 24 for "Outside Protection", where applicable to water piping systems used for fire protection.

B. Separation of Sewers and Potable Water Piping:

1. Horizontal Separation:
 - a. Where possible, existing and proposed potable water mains and service lines, and sanitary, combined, and storm sewers shall be separated horizontally by clear distance of at least ten feet.
 - b. If local conditions preclude the specified clear horizontal separation, installation will be allowed if potable water main is in separate trench or on undistributed earth shelf on one side of sewer and with bottom of potable water main at least 18 inches above top of sewer.
 - c. Exception:
 - 1) Where it is not possible to provide minimum horizontal separation described above, construct potable water main of cement-lined ductile iron pipe with restrained push-on joint or restrained mechanical joint pipe complying with public water supply design standards of authority having jurisdiction. Hydrostatically test water main and sewer as specified in this Section prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.
2. Vertical Separation:
 - a. Provide minimum vertical distance of 18 inches between outside of potable water main and outside of sewer when sewer crosses over potable water main.
 - b. Center a section of potable water main pipe at least 17.5 feet long over sewer so that sewer joints are equidistant from potable water main joints.
 - c. Provide adequate structural support where potable water main crosses under sewer. At minimum, provide compacted select backfill for ten feet on each side of crossing.
 - d. Exceptions:
 - 1) Where it is not possible to provide minimum vertical separation described above, construct potable water main of cement-lined ductile

iron pipe with restrained push-on joint or restrained mechanical joint pipe. Hydrostatically test water main and sewer as specified in this Section, prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.

- 2) Encase either potable water main or sewer in watertight carrier pipe extending ten feet on each side of crossing, measured perpendicular to potable water main.

C. Plugs:

1. Temporarily plug installed pipe at end of each day of work or other interruption of pipe installation to prevent entry of animals, liquids, and persons into pipe, and entrance or insertion of deleterious materials into pipe.
2. Install standard plugs in bells at dead ends, tees, and crosses. Cap spigot and plain ends.
3. Fully secure and block plugs, caps, and bulkheads installed for testing to withstand specified test pressure.
4. Where plugging is required for phasing of the Work or subsequent connection of piping, install watertight, permanent type plugs, caps, or bulkhead acceptable to Engineer.

D. Bedding Pipe: Bed pipe as specified and in accordance with details on the Drawings.

1. Trench excavation and backfill, and bedding materials shall conform to Section 31 23 05, Excavation and Fill, as applicable.
2. Where Engineer deems existing bedding material unsuitable, remove and replace existing bedding with approved granular material furnished, placed, and compacted in accordance with Section 31 23 05, Excavation and Fill. Payment for additional excavation and providing granular material will be made under the unit price payment items in the Contract.
3. Where pipe is installed in rock excavation, provide minimum of three inches of granular bedding material underneath pipe smaller than four-inch nominal diameter, and minimum of six inches of granular bedding material underneath pipes four-inch nominal diameter and larger.
4. Excavate trenches below bottom of pipe by amount shown and indicated in the Contract Documents. Remove loose and unsuitable material from bottom of trench.
5. Carefully and thoroughly compact pipe bedding with hand held pneumatic compactors.
6. Do not lay pipe until Engineer approves bedding condition.
7. Do not bring pipe into position until preceding length of pipe has been bedded and secured in its final position.

E. Laying Pipe:

1. Conform to manufacturer's instructions and requirements of standards and manuals listed below, as applicable:
 - a. Ductile Iron Pipe: ANSI/AWWA C600, ANSI/AWWA C105, AWWA M41.
 - b. Thermoplastic Pipe: ASTM D2321, ASTM D2774, ANSI/AWWA C605, AWWA M23, AWWA M45, AWWA, M55.

- c. Sanitary and Storm Sewers: ASCE 37.
2. Install pipe accurately to line and grade shown and indicated in the Contract Documents, unless otherwise approved by Engineer. Remove and reinstall pipes that are not installed correctly.
 3. Slope piping uniformly between elevations shown.
 4. Keep groundwater level in trench at least 24 inches below bottom of pipe before laying pipe. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete. Keep clean and protect interiors of pipe, fittings, valves, and appurtenances.
 5. Start laying pipe at lowest point and proceed towards higher elevations, unless otherwise approved by Engineer.
 6. Place bell and spigot-type pipe so that bells face the direction of laying, unless otherwise approved by Engineer.
 7. Place concrete pipe containing elliptical reinforcement with minor axis of reinforcement in vertical position.
 8. Excavate around joints in bedding and lay pipe so that pipe barrel bears uniformly on trench bottom.
 9. Deflections at joints shall not exceed 75 percent of amount allowed by pipe manufacturer, unless otherwise approved by Engineer.
 10. For PVC and CPVC piping with solvent welded joints, 2.5-inch diameter and smaller, and copper tubing, snake piping in trench to compensate for thermal expansion and contraction.
 11. Carefully examine pipe, fittings, valves, and specials for cracks, damage, and other defects while suspended above trench before installation. Immediately remove defective materials from the Site and replace with acceptable products.
 12. Inspect interior of all pipe, fittings, valves, and specials and completely remove all dirt, gravel, sand, debris, and other foreign material from pipe interior and joint recesses before pipe and appurtenances are moved into excavation. Bell and spigot-type mating surfaces shall be thoroughly wire brushed, and wiped clean and dry immediately before pipe is laid.
 13. Field cut pipe, where required, with machine specially designed for cutting the type of pipe being installed. Make cuts carefully, without damage to pipe, coating or lining, and with smooth end at right angles to axis of pipe. Cut ends on push-on joint type pipe shall be tapered and sharp edges filed off smooth. Do not flame-cut pipe.
 14. Do not place blocking under pipe, unless specifically approved by Engineer for special conditions.
 15. Touch up protective coatings in manner satisfactory to Engineer prior to backfilling.
 16. Notify Engineer in advance of backfilling operations.
 17. On steep slopes, take measures acceptable to Engineer to prevent movement of pipe during installation.
 18. Thrust Restraint: Where required, provide thrust restraint conforming to Article 3.3 of this Section.
 19. Exercise care to avoid flotation when installing pipe in cast-in-place concrete, and in locations with high groundwater.

F. Jointing Pipe:

1. Ductile Iron Mechanical Joint Pipe:
 - a. Immediately before making joint, wipe clean the socket, plain end, and adjacent areas. Taper cut ends and file off sharp edges to provide smooth surface.
 - b. Lubricate plain ends and gasket with soapy water or manufacturer's recommended pipe lubricant, in accordance with ANSI/AWWA C111, just prior to slipping gasket onto plain end of the joint assembly.
 - c. Place gland on plain end with lip extension toward the plain end, followed by gasket with narrow edge of gasket toward plain end.
 - d. Insert plain end of pipe into socket and press gasket firmly and evenly into gasket recess. Keep joint straight during assembly.
 - e. Push gland toward socket and center gland around pipe with gland lip against gasket.
 - f. Insert bolts and hand-tighten nuts.
 - g. If deflection is required, make deflection after joint assembly and prior to tightening bolts. Alternately tighten bolts approximately 180 degrees apart to seat gasket evenly. Bolt torque shall be as follows:

Pipe Diameter (inches)	Bolt Diameter (inches)	Range of Torque (ft-lbs)
3	5/8	45 to 60
4 to 24	3/4	75 to 90
30 to 36	1	100 to 120
42 to 48	1.25	120 to 150

- h. Bolts and nuts, except those of stainless steel, shall be coated with two coats, minimum dry film thickness of eight mils each, of high build solids epoxy or bituminous coating manufactured by Tnemec, or equal.
 - i. Restrained mechanical joints shall be in accordance with Section 40 05 19, Ductile Iron Process Pipe.
2. Ductile Iron Push-On Joint Pipe:
 - a. Prior to assembling joints, thoroughly clean with wire brush the last eight inches of exterior surface of spigot and interior surface of bell, except where joints are lined or coated with a protective lining or coating.
 - b. Wipe clean rubber gaskets and flex gaskets until resilient. Conform to manufacturer's instructions for procedures to ensure gasket resiliency when assembling joints in cold weather.
 - c. Insert gasket into joint recess and smooth out entire circumference of gasket to remove bulges and to prevent interference with proper entry of spigot of entering pipe.
 - d. Immediately prior to joint assembly, apply thin film of pipe manufacturer's recommended lubricant to surface of gasket that will come in contact with entering spigot end of pipe, or apply a thin film of lubricant to outside of spigot of entering pipe.
 - e. For assembly, center spigot in pipe bell and push pipe forward until spigot just makes contact with rubber gasket. After gasket is compressed and before pipe is pushed or pulled in the rest of the way, carefully check gasket for proper position around the full circumference of joint. Final

assembly shall be made by forcing spigot end of entering pipe past gasket until spigot makes contact with base of the bell. When more than a reasonable amount of force is required to assemble the joint, remove spigot end of pipe to verify proper positioning of gasket. Do not use gaskets that have been scored or otherwise damaged.

- f. Maintain an adequate supply of gaskets and joint lubricant at the Site when pipe jointing operations are in progress.
- 3. Ductile Iron Proprietary Joints:
 - a. Install pipe that utilizes proprietary joints for restraint specified in Section 40 05 19, Ductile Iron Process Pipe, or other such joints, in accordance with manufacturer's instructions.
- 4. Thermoplastic Pipe Joints:
 - a. Solvent Cement Welded Joints:
 - 1) Bevel pipe ends and remove all burrs before making joints. Clean pipe and fittings thoroughly. Do not attempt to make solvent cement joints if temperature is below 40 degrees F. Do not make solvent cement welded joints in wet conditions.
 - 2) Use solvent cement supplied or recommended by pipe manufacturer.
 - 3) Apply joint primer and solvent cement and assemble joints in accordance with recommendations and instructions of manufacturer of joint materials and pipe manufacturer.
 - 4) Take appropriate safety precautions when using joint primers and solvent cements. Allow air to circulate freely through pipelines to allow solvent vapors to escape. Slowly admit water when flushing or filling pipelines to prevent compression of gases within pipes.
 - b. Bell and Spigot Joints:
 - 1) Bevel pipe ends, remove all burrs, and provide a reference mark at correct distance from pipe end before making joints.
 - 2) Clean spigot end and bell thoroughly before making the joint. Insert O-ring gasket while ensuring that gasket is properly oriented. Lubricate spigot with manufacturer's recommended lubricant. Do not lubricate bell and O-ring. Insert spigot end of pipe carefully into bell until reference mark on spigot is flush with bell.
- 5. Copper Tubing Joints:
 - a. Soldered Joints:
 - 1) Assemble copper tubing with soldered joints. Solder shall be 95-5 tin-antimony solder conforming to ASTM B32.
 - 2) Ream or file pipe to remove burrs.
 - 3) Clean and polish contact surfaces of joints.
 - 4) Apply flux to both male and female ends.
 - 5) Insert end of tube into full depth of fitting socket.
 - 6) Heat joint evenly.
 - 7) Form continuous solder bead around entire circumference of joint starting at the bottom.
 - b. Threaded Joints:
 - 1) When open flames for soldering are impractical, or at unions and connections to equipment and appurtenances, assemble copper tubing with flared ends as permitted by authority having jurisdiction.

- 2) Ends of tubing shall be flared at an angle of 45 degrees with flaring tool recommended by pipe manufacturer. Flaring tool shall have same outside diameter as tube to be flared.
 - 3) Tubing to be flared shall be soft temper or annealed prior to flaring.
 - 4) End of tube shall be cut square and reamed to remove burrs.
 - 5) Tube that is out-of-round shall be resized back to round.
 - 6) Clean and polish contact surfaces of joints using an abrasive cloth.
 - 7) Place flare nut over the end of tube with threads closest to end being flared.
 - 8) Insert appropriate length of tube between flaring bar of flaring tool and position the yolk with flaring cone over tube end and clamp yoke in place.
 - 9) Turn handle of yolk clockwise without over-tightening. Cracked or deformed tubes will be rejected.
 - 10) Do not apply jointing compounds to mating surfaces of flare fitting and flared tube end before attaching flare nut to threaded connection.
6. Mechanical Coupling Joints:
- a. Mechanical couplings include: sleeve-type flexible couplings, split flexible couplings, ANSI/AWWA C606 grooved or shouldered end couplings, plasticized PVC couplings, and other mechanical couplings specified in Section 40 05 06, Couplers, Adapters, and Specials for Process Piping.
 - b. Prior to installing and assembling mechanical couplings, thoroughly clean joint ends with wire brush to remove foreign matter.
 - c. For mechanical couplings that incorporate gaskets, after cleaning apply lubricant to rubber gasket or inside of coupling housing and to joint ends. After lubrication, install gasket around joint end of previously installed piece and mate joint end of subsequent piece to installed piece. Position gasket and place coupling housing around gasket and over grooved or shouldered joint ends. Insert bolts and install nuts tightly by hand. Tighten bolts uniformly to produce an equal pressure on all parts of housing. When housing clamps meet metal to metal, joint is complete and further tightening is not required.
 - d. For plasticized PVC couplings, loosen the stainless steel clamping bands and remove clamps from coupling. Slide coupling over plain ends of pipes to be joined without using lubricants. Place clamps over each end of coupling at grooved section and tighten with torque wrench to torque recommended by manufacturer.
7. HDPE Pipe Joints:
- a. Bell and Spigot Joints:
 - 1) Remove all burrs and provide reference mark at correct distance from pipe end. Place mark such that no more than 1/2-inch of machined spigot surface will be visible outside of bell after pipe has been joined.
 - 2) Clean spigot end and bell thoroughly with soap and water before positioning gasket.
 - 3) Lubricate spigot groove with manufacturer's recommended lubricant. Thoroughly clean gasket and place in spigot groove starting at bottom, ensuring that gasket fins face backwards toward pipe.

- 4) Thoroughly lubricate gasket with pipe manufacturer's recommended lubricant and equalize stretch in gasket by running screwdriver under gasket around its entire circumference three times. Reposition gasket in groove after stretching.
 - 5) Thoroughly clean and lubricate receiving bell. Align pipe as straight as possible and insert spigot end of pipe carefully into bell until reference mark on spigot is flush with bell.
 - 6) If mechanical means are used to insert spigot end, protect with wood the end of pipe being pushed, to ensure even distribution of pressure.
- b. Butt Fusion Welded Joints:
- 1) Install joints in accordance with manufacturer's instructions using hydraulic butt fusion machine or manual machine equipped with torque wrench. Equipment shall be able to achieve and maintain heating tool temperature range of 400 to 450 degrees F and an interface pressure of 60 to 90 psi.
 - 2) Clean interior and exterior of pipe and fitting ends with clean, dry, lint-free cloth.
 - 3) Align ends to be joined in the fusion machine without forcing ends into alignment. Adjust alignment as necessary and tighten clamps to prevent slippage.
 - 4) Place facing tool between ends to be joined and face them to provide clean, smooth, parallel mating surface. If stops are present, face ends down to the stops. Remove all shavings after facing without touching ends.
 - 5) Re-check alignment of ends and check for slippage against fusion pressure. There shall be no detectable gaps between ends. Align outside diameters.
 - 6) Heating tool shall maintain pipe manufacture's recommended temperature range. Place the tool between ends to be joined. Move ends against heating tool to achieve full contact. Hold ends against heating tool without force until the following melt bead size is formed:

Pipe Diameter (inches)	Required Melt Bead Size (inches)
2 to 4	1/8 to 3/16
4 to 12	3/16 to 1/4
12 to 24	1/4 to 7/16
24 to 54	7/16 to 9/16

- 7) Upon forming proper melt bead size, quickly separate ends and remove heating tool. Quickly inspect melted ends and bring ends together applying joining force recommended by manufacturer, using 60 to 90 psi interfacial pressure to form double bead rolled over surface of pipe on both ends.
- 8) Hold joining force against ends until joint is cool to the touch. Cooling period shall be 30 to 90 seconds per inch of pipe diameter. Heavier wall thicknesses may require longer cooling times as recommended by pipe manufacturer.
- 9) Upon completing joint, inspect to verify double bead has been formed

on both sides, uniformly rounded and consistent in size all around joint. Remove faulty joints and re-joint.

G. Backfilling:

1. Conform to applicable requirements of Section 31 23 05, Excavation and Fill.
2. Place backfill as Work progresses. Backfill by hand and use power tampers until pipe is covered by at least one foot of backfill.

H. Connections to Valves and Hydrants:

1. Install valves and hydrants as shown and indicated in the Contract Documents.
2. Provide suitable adapters when valves or hydrants and piping have different joint types.
3. Provide thrust restraint at all hydrants and at valves located at pipeline terminations.

I. Transitions from One Type of Pipe to Another:

1. Provide necessary adapters, specials, and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

J. Closures:

1. Provide closure pieces shown or required to complete the Work.

3.2 TRACER TAPE INSTALLATION

A. Polyethylene Underground Warning Tape for Metallic Pipelines:

1. Provide polyethylene tracer tape for buried metallic piping, which includes pipe that is steel, ductile iron, cast iron, concrete, copper, and corrugated metal.
2. Provide tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.
3. For pipelines buried eight feet or greater below finished grade, provide second line of magnetic tracer tape 2.5 feet above crown of buried pipe, aligned along pipe centerline.
4. Tape shall be spread flat with message side up before backfilling.

B. Detectable Underground Warning Tape for Non-Metallic Pipelines:

1. Provide polyethylene tracer tape with aluminum backing for buried, non-metallic piping, which includes pipe that is PVC, CPVC, polyethylene, HDPE, FRP, ABS, and vitrified clay.
2. Provide magnetic tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.
3. For pipelines buried eight feet or greater below finished grade, provide second line of magnetic tracer tape 2.5 feet above crown of buried pipe, aligned along the pipe centerline.
4. Tape shall be spread flat with message side up before backfilling.

3.3 THRUST RESTRAINT

- A. Provide thrust restraint on pressure piping systems where shown or indicated in the Contract Documents.
- B. Thrust restraint may be accomplished by using restrained pipe joints, concrete thrust blocks, or harnessing buried pipe. Thrust restraints shall be designed for axial thrust exerted by test pressure specified in the Buried Piping Schedule at the end of this Section.
- C. Place concrete thrust blocks against undisturbed soil. Where undisturbed soil does not exist, or for projects where the Site consists of backfill material, thrust restraint shall be provided by restrained pipe joints.
- D. Restrained Pipe Joints:
 - 1. Pipe joints shall be restrained by means suitable for the type of pipe being installed.
 - a. Ductile Iron, Push-on Joints and Mechanical Joints: Restrain with proprietary restrained joint system as specified in Section 40 05 19, Ductile Iron Process Pipe; lugs and tie rods; or other joint restraint systems approved by Engineer.
 - b. Steel Pipe Joints: Provide butt-welded joints, lap welded joints, flanged joints, or mechanical coupling connections as shown and specified in Buried Piping Schedule in this Section. Provide tie rods connected to lugs welded to the steel pipe for restraint at mechanical couplings.
 - c. Thermoplastic and HDPE Joints: Where bell and spigot-type or other non-restrained joints are utilized, provide tie rods across joint or other suitable joint restraint system, subject to the approval of Engineer.
 - d. Prestressed Concrete Cylinder Pipe Joints: Restrain utilizing clamp type restrained joint, snap ring-type restrained joint, or by welding. Concrete pipe requiring restraint shall have sufficient longitudinal steel reinforcement provided to handle thrust forces at maximum design stress of 12,500 psi. Thrust forces in longitudinales must be transmitted directly to steel joint bands using welded connections sufficient to carry stresses involved. No allowance for the concrete to handle tensile forces is allowed. Thrust restraint shall be in accordance with ANSI/AWWA Manual M9.
 - e. Joints for Concrete Pipe Other than Prestressed Concrete Cylinder Pipe: Restrain joints utilizing clamp type restrained joint or snap ring-type restrained joint.
- E. Concrete Thrust Blocks:
 - 1. Provide concrete thrust blocks on pressure piping at changes in alignment of 15 degrees or more, at tees, plugs and caps, and where shown or indicated in the Contract Documents. Construct thrust blocks of Class B concrete, conforming to 03 00 05, Concrete.
 - 2. Install thrust blocks against undisturbed soil. Place concrete so that pipe and fitting joints are accessible for repair.
 - 3. Concrete thrust block size shall be as shown on the Drawings or as approved by Engineer.

3.4 WORK AFFECTING EXISTING PIPING

- A. Location of Existing Underground Facilities:
 - 1. Locations of existing Underground Facilities shown on the Drawings should be considered approximate.
 - 2. Determine the true location of existing Underground Facilities to which connections are to be made, crossed, and that could be disturbed, and determine location of Underground Facilities that could be disturbed during excavation and backfilling operations, or that may be affected by the Work.
- B. Taking Existing Pipelines and Underground Facilities Out of Service:
 - 1. Conform to Section 01 14 16, Coordination with Owner's Operations.
 - 2. Do not take pipelines or Underground Facilities out of service unless specifically listed in Section 01 14 16, Coordination with Owner's Operations, or approved by Engineer.
 - 3. Notify Engineer in writing prior to taking pipeline or Underground Facilities out of service. Shutdown notification shall be provided in advance of the shutdown in accordance with the General Conditions and Section 01 14 16, Coordination with Owner's Operations.
- C. Work on Existing Pipelines or Underground Facilities:
 - 1. Cut or tap piping or Underground Facilities as shown or required with machines specifically designed for cutting or tapping pipelines or Underground Facilities, as applicable.
 - 2. Install temporary plugs to prevent entry of mud, dirt, water, and debris into pipe.
 - 3. Provide necessary adapters, sleeves, fittings, pipe, and appurtenances required to complete the Work.
 - 4. Conform to applicable requirements of Section 01 14 16, Coordination with Owner's Operations, Section 01 73 29, Cutting and Patching, and Section 01 73 24, Connections to Existing Facilities.

3.5 FIELD QUALITY CONTROL

- A. General:
 - 1. Test all piping, except as exempted in the Buried Piping Schedule in this Section.
 - 2. When authorities having jurisdiction are to witness tests, notify Engineer and authorities having jurisdiction in writing at least 48 hours in advance of testing.
 - 3. Conduct all tests in presence of Engineer.
 - 4. Remove or protect pipeline-mounted devices that could be damaged by testing.
 - 5. Provide all apparatus and services required for testing, including:
 - a. Test pumps, compressors, hoses, calibrated gages, meters, test containers, valves, fittings, and temporary pumping systems required to maintain Owner's operations.
 - b. Temporary bulkheads, bracing, blocking, and thrust restraints.

6. Provide air if an air test is required, power if pumping is required, and gases if gases are required.
7. Unless otherwise specified, Owner will provide fluid required for hydrostatic testing. Contractor shall provide means to convey fluid for hydrostatic testing into piping being tested. Contractor shall provide fluid for other types of testing required.
8. Repair observed leaks and repair pipe that fails to meet acceptance criteria. Retest after repair.
9. Unless otherwise specified, testing shall include existing piping systems that connect with new piping system. Test existing pipe to nearest valve. Piping not installed by Contractor and that fails the test shall be repaired upon authorization of Owner. Unless otherwise included in the Work, repair of existing piping or Underground Facilities will be paid as extra Work.

B. Test Schedule:

1. Refer to the Buried Piping Schedule in this Section for type of test required and required test pressure.
2. Unless otherwise specified, required test pressures are at lowest elevation of pipeline segment being tested.
3. For piping not listed in Buried Piping Schedule in this Section:
 - a. Hydrostatically test pipe that will convey liquid at a pressure greater than five psig. Provide process air pipe test for pipe that will convey air or gas under pressure or vacuum, except chlorine gas, which requires separate test.
 - b. Use exfiltration testing, low-pressure air testing, or vacuum testing for other piping.
 - c. Disinfect for bacteriological testing piping that conveys potable water.
4. Test Pressure:
 - a. Use test pressures listed in Buried Piping Schedule in this Section.
 - b. If test pressure is not listed in Buried Piping Schedule, or if test is required for piping not listed in the Buried Piping Schedule, test pressure will be determined by Engineer based on maximum anticipated sustained operating pressure and methods described in applicable ANSI/AWWA manual or standard that applies to the piping system.

C. Hydrostatic Testing:

1. Preparation for Testing:
 - a. For thermoplastic pipe and fiberglass pipe, follow procedures described in Section 7 of ANSI/AWWA Standard C605.
 - b. For HDPE pipe, follow procedures described in ASTM F2164. Test duration, including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize, shall not exceed eight hours. If re-testing of a test section or pipeline is required, at least eight hours shall elapse between tests.
 - c. For steel pipe, follow procedures described in ANSI/AWWA Manual M11. Wetting period is not required for pipe that is not cement-lined.
 - d. For other piping follow procedures described in ANSI/AWWA Manual M9, except that minimum wetting period required immediately prior to

testing for asbestos cement pipe shall be 24 hours rather than the 48 hours prescribed for concrete pipe. Wetting period is not required for pipe that is not cement mortar-lined.

- e. Prior to testing, ensure that adequate thrust protection is in place and joints are properly installed.
2. Test Procedure:
- a. Fill pipeline slowly to minimize air entrapment and surge pressures. Fill rate shall not exceed one foot of pipe length per second in pipe being tested.
 - b. Expel air from pipe as required. Obtain approval of Engineer prior to tapping pipe for expelling air.
 - c. Examine exposed joints and valves, and make repairs to eliminate visible leakage.
 - d. After specified wetting period, add fluid as required to pressurize line to required test pressure. Maintain test pressure for a stabilization period of ten minutes before beginning test.
 - e. HDPE Pipe: After filling pipeline, gradually pressurize pipe to test pressure and maintain required test pressure for three hours for pipe to expand. During expansion, add fluid to maintain required test pressure. Begin timed test period after expansion period and other requirements are met.
 - f. Timed test period shall not begin until after pipe has been filled, exposed to required wetting period, air has been expelled, and pressure stabilized.
 - g. Timed Test Period: After stabilization period, maintain test pressure for at least two hours. During timed testing period, add fluid as required to maintain pressure within five psig of required test pressure. For HDPE pipe, after three hour expansion phase, reduce test pressure by ten psig and do not add liquid. Test pressure shall then remain steady for one hour, indicating no leakage.
 - h. Pump from test container to maintain test pressure. Measure volume of fluid pumped from test container and record on test report. Record pressure at test pump at 15 minute intervals for duration of test.
3. Allowable Leakage Rates: Leakage is defined as the quantity of fluid supplied to pipe segment being tested to maintain pressure within five psi of test pressure during timed test period. Allowable leakage rates for piping are:
- a. No Leakage: Pipe with flanged, welded, fused, threaded, soldered, or brazed joints.
 - b. Rates based on formula or table in ANSI/AWWA Manual M41:
 - 1) Metal and fiberglass pipe joined with rubber gaskets as sealing members, including the following joint types:
 - a) Bell and spigot and push-on joints.
 - b) Mechanical joints.
 - c) Bolted sleeve type couplings.
 - d) Grooved and shouldered couplings.
 - c. Rates based on make-up allowance in ANSI/AWWA Manual M9:
 - 1) Prestressed concrete cylinder pipe and other types of concrete pipe joined with O-ring rubber gasket sealing members.
 - d. Rates based on formula or table in ANSI/AWWA C605:

- 1) Plastic pipe joined with O-ring gasket sealing members.
- e. Rates based on formula or table in ANSI/AWWA C603:
 - 1) Asbestos-cement pipe.
- D. Sewer Testing with Low Pressure Air:
 - 1. Plug and bulkhead ends and lateral connections of pipe segment to be tested.
 - 2. Required test pressure shall be increased by an amount equal to the elevation of groundwater above invert of lowest point of pipe segment being tested.
 - 3. Test in accordance with requirements of authority having jurisdiction.
 - 4. If there are no Laws and Regulations covering the test, use test procedures described in the following standards:
 - a. Thermoplastic and HDPE Pipe: ASTM F1417.
 - b. Concrete Pipe: ASTM C924.
 - c. Clay Pipe: ASTM C828.
- E. Vacuum Testing:
 - 1. Plug and bulkhead ends and lateral connections of pipe segment or manhole to be tested.
 - 2. Following set-up of test apparatus, draw vacuum of ten inches of mercury on pipe segment or manhole being tested.
 - 3. Start test upon reaching specified test vacuum. Test duration shall be 15 minutes.
 - 4. Record vacuum drop at end of test. If vacuum drop is greater than one inch of mercury, pipe segment or manhole fails the test and shall be repaired and retested. If vacuum drop is less than one inch of mercury, pipe segment or manhole passes the test.
- F. Vertical Deflection Test for Thermoplastic, FRP, and HDPE Pipe:
 - 1. Conduct vertical deflection test at least thirty days after backfill has been placed.
 - 2. Use rigid ball or mandrel for deflection test, which shall have diameter of at least 95 percent of base inside diameter or average inside diameter of piping, depending on which is specified in applicable ASTM standard, including appendix, to which pipe is manufactured. Perform test without mechanical pulling devices. Re-install and retest pipe segments that exceed deflection of five percent.
- G. Bacteriological Testing:
 - 1. Bacteriological testing for potable water lines, finished water lines, and other piping in accordance with the Buried Piping Schedule, is specified in Article 3.6 of this Section.

3.6 CLEANING AND DISINFECTION

- A. Cleaning, General: Clean pipe systems as follows:
 - 1. Thoroughly clean all piping, including flushing with water, dry air, or inert gas as required, in manner approved by Engineer, prior to placing in service. Flush chlorine solution and sodium hypochlorite piping with water.

2. Piping 24-inch diameter and larger shall be inspected from inside and debris, dirt and foreign matter removed.
 3. For piping that requires disinfection and has not been kept clean during storage or installation, swab each section individually before installation with five percent sodium hypochlorite solution.
- B. Cleaning of Gas and Air Piping:
1. Unless otherwise specified, non-chlorine gas and air system piping six-inch diameter and smaller shall be blown out, using air or testing medium specified. Piping larger than six-inch diameter shall be cleaned by having a swab or “pig” drawn through each pipe reach.
 2. After connecting to equipment, blow out pipe using the equipment.
 3. Upon completion of cleaning, piping shall be drained and dried with blown air. Propane systems shall be purged with nitrogen and nitrogen pad maintained at ten psi until pipe is placed in service. Purge digester gas systems with nitrogen and maintain nitrogen pad at three psi until line is placed in service.
- C. Disinfection:
1. Disinfect all potable and finished water piping.
 2. Suggested procedure for accomplishing complete and satisfactory disinfection is specified below. Other procedures may be considered for acceptance by Engineer.
 - a. Prior to disinfection, clean piping as specified and flush thoroughly.
 - b. Conform to procedures described in ANSI/AWWA C651. Use continuous feed method of disinfecting, unless alternative method is acceptable to Engineer.
 3. Water for initial flushing, testing, and disinfection will be furnished by Owner. Contractor shall provide all temporary piping, hose, valves, appurtenances, and services required. Cost of water required for redisinfection will be paid by Contractor to Owner at water utility’s standard rates.
 4. Chlorine shall be provided by Contractor.
 5. Bacteriologic tests will be performed by Owner. Certified test laboratory report will be provided to Contractor, if requested.
 6. Chlorine concentration in water entering the piping shall be between 50 and 100 ppm, such that minimum residual concentration of 25 mg/L remains after 24-hour retention period. Disinfect piping and all related components. Repeat as necessary to provide complete disinfection.
 7. After required retention period, flush chlorinated water to closed drain line, unless otherwise acceptable to Engineer. Properly dispose of chlorinated water in accordance with Laws and Regulations. Do not discharge chlorinated water to storm sewers, ditches, or overland.

3.8 SCHEDULES

- A. Schedules listed below, following the “End of Section” designation, are part of this Specification section.
1. Table 33 05 05-A, Buried Piping Schedule.

++ END OF SECTION ++

TABLE 33 05 05-A, BURIED PIPING SCHEDULE

Service	Diameter (inch)	Material	Interior Lining	Exterior Coating	Pressure Class/ Thicknes s	Joint	Test	Remarks
Sanitary	8	PVC	--	--	SDR 35	BS	Air	
Storm	As Shown	PVC	--	--	SDR 35	BS	Air	
Fire Protection	6"	DI	CL	AC		RMJ	Hyd (150)	

The following abbreviations are used in the Buried Piping Schedule.

A. Service Abbreviations

Service	Abbrev		Service	Abbrev.
Sanitary Sewer	SAN		Wastewater	WW
Storm Sewer	ST		Overflow	OF
Combined Sewer	CS		Centrate	CEN
Sanitary Force Main	SFM		Filtrate	FILT
Raw Water	RW		Scum	SCUM
Potable Water	PW		Primary Sludge	PS
City Water	CW		Return Activated Sludge	RAS
Non-Potable Water	NPW		Waste Activate Sludge	WAS
Plant Effluent Water	PEW		Thickened Sludge	TS
Spray Water	SPW		Mixed Sludge	MS
Backwash Water	BW		Digested Sludge	DS
Hot Water Supply	HWS		Chlorine Solution	CLS
Hot Water Return	HWR		Sodium Hydroxide	NAOH
Influent	INF		Sodium Hypochlorite	NAOCL
Effluent	EFF		Polymer Solution	POLYS
Drain	DR		Alum	AL
Process Air	PA		Hydraulic Fluid	HF
Instrument Air	IA		Fuel Oil	FO
Digester Gas	DIG		Lube Oil	LO
Chlorine Gas	CLG			

B. Material Abbreviations

Material	Abbrev		Material	Abbrev.
Ductile Iron	DI		Polyvinyl Chloride	PVC
Cast Iron	CI		Chlorinated Polyvinyl Chloride	CPVC
Carbon Steel	CS		Polyethylene	PE
Stainless Steel	SS		High Density Polyethylene	HDPE
Copper	C		Fiberglass Reinforced Plastic	FRP
Corrugated Metal Pipe	CMP		Acrylonitrile Butadiene Styrene	ABS
Reinforced Concrete Pipe	RCP		Vitrified Clay	VC
Prestressed Concrete Cylinder Pipe	PCCP			
Non-Prestressed Concrete Cylinder Pipe	CCP			
Steel Cylinder Pipe	SCP			

C. Lining/Coating Abbreviations

Lining	Abbrev		Coating	Abbrev.
Cement Mortar Lined	CL		Asphaltic Coated	AC
Glass Lined	GL		Polyethylene Wrapped	PEW
Ceramic Epoxy	CE		Painted	P
Fusion Bonded Epoxy Lined	FBEL		Fusion Bonded Epoxy Coated	FBEC
Plastic Lined	PL		Insulated	I
			Galvanized	Galv

D. Joint Abbreviations

Joint Type	Abbrev		Joint Type	Abbrev.
Bell and Spigot	BS		Butt Weld	BW
Restrained Bell and Spigot	RBS		Lap Weld	LW
Push-on Joint	POJ		Butt Fusion Weld	BFW
Restrained Push-on Joint	RPOJ		Solvent Weld	SW
Mechanical Joint	MJ		Sleeve-type Flexible Coupling	SLFC
Restrained Mech. Joint	RMJ		Split Flexible Coupling	SPFC
Soldered	Sd		Plasticized PVC Coupling	PPVC
Brazed	Bz		Grooved or Shouldered End Coupling	GSEC

Threaded	Thd		Flanged	Flg
Compression Sleeve Coupling	CSC		Compression Flange Adapter	CFA

E. Test Abbreviations

Test	Abbrev		Test	Abbrev.
Hydrostatic Test (test pressure in psig)	HYD ()		Process Air Pipe Test (test pressure in psig)	PA ()
Exfiltration	EX		Chlorine Pipe Test	CL
Low-pressure Air Sewer Test	AIR		Disinfection and Bacteriological Testing	DBT
Vacuum Test	VAC		Examination of Welds	EW
Vertical Deflection	VD		No Test Required	NR
Televised Inspection	TV			

SECTION 33 05 13

MANHOLES AND STRUCTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all precast, cast-in-place manholes and structures.

B. General:

1. Manholes and structures shall conform in shape, size, dimensions, material, and other respects to the details shown or as directed by Engineer.
2. Cast-iron frames, grates and covers shall be the standard frame and grate or cover unless otherwise shown and shall be as specified on the drawings.
3. Concrete for cast-in-place manholes and structures and for inverts in precast and masonry manholes and structures shall be Class "A" and shall conform to the requirements specified under Section 03 00 05, Concrete.

C. Related Sections:

1. Section 03 00 05, Concrete.
2. Section 05 50 13, Miscellaneous Metal Fabrications.

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American Society for Testing and Materials, (ASTM).
 - a. ASTM C 32, Specification for Sewer and Manhole Brick (made from Clay or Shale).
 - b. ASTM C 139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
 - c. ASTM C 140, Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - d. ASTM C 207, Specification for Hydrated Lime for Masonry Purposes.
 - e. ASTM C 478, Specification for Precast Reinforced Concrete Manhole Sections.
2. American Water Works Association, (AWWA).
 - a. AWWA C302, Reinforced Concrete Pressure Pipe, Non-cylinder Type, for Water and Other Liquids.

1.3 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Submit drawings showing design and construction details of all precast concrete and cast-in-place manholes and structures, including details of joints between the manhole bases and riser sections and stubs or openings for the connections.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE MANHOLES AND STRUCTURES

- A. Precast manholes and structures shall conform to the details shown. Provide cast-in-place concrete bases where shown.
- B. Except where otherwise specified precast manhole components shall consist of reinforced concrete pipe sections especially designed for manhole construction and manufactured in accordance with ASTM C 478, except as modified herein.
- C. Precast, reinforced concrete manhole bases, riser sections, flat slabs and other components shall be manufactured by wet cast methods only, using forms which will provide smooth surfaces free from irregularities, honeycombing or other imperfections.
- D. Joints between manhole components shall be the tongue and groove type employing butyl rubber sealant.
- E. All precast manhole components shall be of approved design and of sufficient strength to withstand the loads imposed upon them. They shall be designed for a minimum earth cover loading of 130 pounds per cubic foot, an H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact. Manhole bases shall have two cages of reinforcing steel in their walls, each of the area equal to that required in the riser sections. Wall thickness shall not be less than 5-inches. Concrete top slabs shall not be less than 8-inches thick.
- F. Lifting holes, if used in manhole components, shall be tapered, and no more than two shall be cast in each section. Tapered, solid rubber plugs shall be furnished to seal the lifting holes. The lifting holes shall be made to be sealed by plugs driven from the outside face of the section only.
- G. The point of intersection (P.I.) of the sewer pipe centerlines shall be marked with 1/4-inch diameter steel pin firmly enclosed in the floor of each manhole base and protruding approximately 1-inch above the finished floor of the base.
- H. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- I. The barrel of the manhole shall be constructed of various lengths of riser pipe manufactured in increments of one foot to provide the correct height with the fewest joints. Openings in the barrel of the manholes for sewers or drop connections will not

be permitted closer than one foot from the nearest joint. Special manhole base or riser sections shall be furnished as necessary to meet this requirement.

- J. A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover.

2.2 MISCELLANEOUS METALS

- A. Metal frames and covers and similar required items shall be provided as shown on the drawings.

PART 3 - EXECUTION

3.1 LAYING MASONRY

- A. Brick shall be satisfactorily wet when being laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The joints shall not be wider than 3/8-inch, except when the bricks are laid radially, in which case the narrowest part of the joint shall not exceed 1/4-inch. Masonry work shall be kept moist for a period of three days after completion, and precautions shall be taken to prevent freezing during cold weather.
- B. For concrete block, the vertical keyways shall be completely filled with mortar.
- C. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

3.2 PLASTERING

- A. The outside of brick manholes and structures, brick stacks and grading rings shall be neatly plastered with 1/2-inch of cement mortar as the Work progresses.

3.3 MANHOLE BASES

- A. Precast bases shall be set on a crushed stone or crushed gravel foundation as shown. Precast bases shall be set at the proper grade and carefully leveled and aligned.

3.4 PRECAST MANHOLE SECTIONS

- A. Set sections vertical with steps and sections in true alignment. The base of the bell or groove end at joints between components shall be buttered with 1:2 cement-sand mortar to provide a uniform bearing between components. All joints shall be sealed with cement mortar inside and out and troweled smooth to the contour of the wall surface. Raised or rough joint finishes will not be accepted.
- B. Install sections, joints and gaskets in accordance with manufacturers recommendations.

- C. Lifting holes shall be sealed tight with a solid rubber plug driven into the hole from the outside of the barrel and the remaining void filled with 1 to 2 cement-sand mortar.

3.5 MANHOLE CHANNELS

- A. All invert channels through manholes and structures shall be constructed of Class “A” concrete. Channels shall be properly formed to the sizes, cross sections, grades and shapes shown or as ordered. Benches shall be built up to the heights shown or as directed by the Engineer and given a uniform wood float finish. Care shall be taken to slope all benches for proper drainage to the invert channel.

3.6 GRADING RINGS

- A. Grading rings or brick stacks shall be used for all precast and masonry manholes and structures, where required. Stacks or grade rings shall be a maximum of 12-inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack or grade rings shall be such as required to bring the manhole frame to the proper grade.
- B. Each grade ring shall be laid in a full bed of mortar and shall be thoroughly bonded.
- C. Brick work shall be as specified in Article 2.2 and Article 3.1, above.

3.7 STUBS FOR FUTURE CONNECTIONS

- A. As shown or required for connections, cast iron sleeves, bell end tile, ductile iron or reinforced concrete pipe stubs with approved watertight plugs shall be installed in manholes and structures. Where pipe stubs, sleeves or couplings for future connections are shown or directed by the Engineer, Contractor shall provide all materials and labor in order to complete the Work.

3.8 GRADING AT MANHOLES AND STRUCTURES

- A. All manholes and structures in unpaved areas shall be built, as shown or directed by the Engineer, to an elevation higher than the original ground. The ground surface shall be graded to drain away from the manhole. Fill shall be placed around manholes to the level of the upper rim of the manhole frame, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground, unless otherwise shown or directed by the Engineer. The slope shall be covered with 4-inches of topsoil, seeded and maintained until a satisfactory growth of grass is obtained.
- B. Manholes and structures in paved areas shall be constructed to meet the final surface grade. In paved areas on State Highways, all manholes and structures shall be 1/2-inch below final wearing surfaces. Manholes and structures shall not project above finished roadway pavements to prevent damage from snowplows.

- C. Contractor shall be solely responsible for the proper height of all manholes and structures necessary to reach the final grade at all locations. Contractor is cautioned that Engineer's review of Shop Drawings for manhole components will be general in nature and Contractor shall provide an adequate supply of random length precast manhole riser sections to adjust any manhole to meet field conditions for final grading.

3.9 MANHOLE WATERTIGHTNESS

- A. All manholes and structures shall be free of visible leakage. Each manhole shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to 'S' approval. Manhole testing shall conform to the requirements of Section 33 05 05, Buried Piping Installation.

3.10 FLEXIBLE PIPE JOINT AT MANHOLE BASE

- A. An approved flexible joint shall be provided between each pipe entering and exiting the manhole. This may be accomplished by the installation in the manhole base of the bell end of a pipe or by other means subject to approval of Engineer. Joints shall be similar to the approved pipe joints. The joint into the manhole base shall be completely watertight.

+ + END OF SECTION + +

SECTION 33 14 23

INSULATED ENCLOSURE

PART 1 - GENERAL

1.1 SUMMARY

A. Scope:

1. Provide and install custom manufactured valve enclosure.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. The valve enclosure manufacturer shall be a company specializing in the manufacture of valve enclosures with at least 10 years of successful experience designing and selling enclosures to various customers in different climatic regions.

1.3 STORAGE AND HANDLING

- ###### A. Store products in covered storage and maintain in dry place until installation.

1.4 ACCEPTABLE MANUFACTURERS

A. The valve enclosure shall be as manufactured by:

1. Hot Box® by Hubbel, Model HBM6E.
2. Or equal.

1.5 REFERENCES

A. ASTM B209.

B. ASTM B221.

C. ASSE 1060-Performance Requirements for Outdoor Enclosures for Backflow Prevention assemblies.

PART 2 - PRODUCTS

2.1 SECTIONALIZED ALUMINUM ENCLOSURES

- A. Sectionalized enclosures are factory assembled with tongue and grooved sections that slide together and are then secured to the concrete pad with the supplied anchor pads and wedge anchors.
- B. Access panels have a four point locking system with pad lockable handle and are completely removable.
- C. Standard enclosures shall be designed to support a minimum vertical load of 100lb/sf.
- D. Standard enclosures up to 36"W x 105"L x 64"H shall be designed to support wind speeds up to 120mph, all larger sizes shall be designed to support wind speeds up to 80mph.
- E. Standard enclosures are ASSE 1060 certified.
- F. Custom enclosures are designed and constructed in the same manner as standard certified enclosures but have not been lab tested and listed by ASSE.

2.2 MATERIALS OF FABRICATION

- A. Aluminum sheeting shall be 3003 aluminum (.050/18 gauge), stucco embossed finish and shall meet ASTM B209. Stucco embossed finish reduces the glare and helps hide any surface scratches or imperfections received in the field.
- B. Bracing shall be 6063-T52 aluminum and shall meet ASTM B221
- C. No wood or particle board used in the construction of the valve enclosure.
- D. Anchor pads shall be galvanized steel. 3/8-16 unc x 2 ¾ long zinc plated wedge anchors are supplied.
- E. 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.
- F. The Insulation shall have the following properties:
 - R-Value 10
 - Dimensional Stability less than 2% linear change
 - Compressive Strength 51psi
 - Flame point 325 degrees
 - Water absorption .037psf
 - Porosity 91%

2.3 HEATING EQUIPMENT

- A. Heating equipment will protect the piping and equipment from exterior temperatures to -30°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°F, in accordance with ASSE 1060 1.2.2.1.
- B. Heating equipment shall be wall mounted to the supplied heater plates and a minimum of 8" above the slab unless it is UL or ETL certified and NEC approved for submersion.
- C. 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.
- D. Separate 20-amp circuits are recommended for each heater, so in the event a circuit fails all other circuits will remain powered. Installations must be in accordance with the local and national codes.
- E. The heaters shall be ETL listed for wet/damp locations.

PART 3 – EXECUTION

3.1 GENERAL

- A. Install valve enclosure and appurtenances in accordance with the manufacturer's recommendations.
- B. The enclosure shall be assembled per the manufacturer's instructions provided with the valve enclosure.

+ + END OF SECTION + +

SECTION 33 44 13

DRAINAGE STRUCTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all precast and masonry drainage structures, including drain inlets, catch basins, headwalls and similar structures.

B. General:

1. Structures shall conform in shape, size, dimensions, materials, and other respects to the details shown or as directed by the Engineer.
2. Cast iron frames, grates and covers shall be the standard frame and grate or cover, unless otherwise shown.
3. All concrete shall be Class "A" and shall conform to the requirements specified under Section 03 00 05, Concrete.
4. Inverts shall be as shown and shall conform accurately to the size and elevation of the adjoining pipes.

C. Related Sections:

1. Section 03 00 05, Concrete.
2. Section 05 50 13, Miscellaneous Metal Fabrications.

1.2 QUALITY ASSURANCE

A. Standards referenced in this Section are listed below:

1. American Society for Testing and Materials, (ASTM).
 - a. ASTM C579, Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - b. ASTM C580, Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - c. ASTM C 307, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
 - d. ASTM D 570, Standard Test Method for Water Absorption of Plastics.
 - e. ASTM C 267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
 - f. ASTM C 666, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

- g. ASTM G 21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.3 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Submit drawings showing design and construction of all precast concrete.
 - 2. Samples:
 - a. Submit for approval samples of brick, block, gaskets and accessories, if any, for the structures.

PART 2 - PRODUCTS

2.1 PRECAST PRODUCTS

- A. Where shown or otherwise approved by Engineer, precast concrete shall be used for items such as trench, area drains, catch basins, splash pads, etc. Layout and details shall be as shown and specified. Design shall be adequate to withstand all loads imposed, including earth pressure, vehicle loads and construction loading.
- B. Where precast structures are made up of various precast components such as base sections, riser sections and top sections, the joint between sections shall be the tongue and groove type.

2.2 MISCELLANEOUS METALS

- A. Metal frames, covers, grates, troughs and similar required items shall be provided as shown and in accordance with Division 05, Metals, and applicable Sections on Metal Fabrications.

PART 3 - EXECUTION

3.1 PRECAST ITEMS

- A. Precast products shall be placed on a concrete or crushed stone bed, set at the proper grade and carefully leveled and aligned.
- B. Backfill shall be carried up evenly on all sides of the structures to prevent overturning forces.

3.2 PIPE JOINT IN STRUCTURE BASE

- A. An approved joint shall be provided between each pipe entering and exiting the structure. Joint may be accomplished by the installation in the structure base of the bell end of a short pipe or by other means subject to approval of Engineer.

- B. Pipes shall not protrude inside the structure, but shall be cut in an approved manner to be flush with the inside wall of the structure.

+ + END OF SECTION + +

SECTION 33 44 36

OIL WATER SEPARATOR

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This section describes requirements for providing a single walled, protected steel underground gravity based Oil/Sand Interceptor.
2. The Oil/Sand Interceptor shall be designed to intercept and collect sand, grit, and free oil and grease (hydrocarbons and other petroleum products) and prevent their entry into the sanitary sewer system.
3. All parts, not specifically mentioned herein which are necessary in order to furnish a complete unit, shall be provided and shall conform to the best practices known to the trade.

1.2 GENERAL REQUIREMENTS

- A. Unless otherwise specified, equipment furnished under this section shall be fabricated and installed in compliance with the instructions of the manufacturer.
- B. The Contractor shall ensure that all equipment, accessories, and installation materials comply with the specification and that adequate provision is made in the interceptor design and fabrication for mounting the specified system equipment and accessories.
- C. The Contractor is solely responsible for construction means, methods, techniques, sequences and procedures and for safety precautions and programs.

1.3 STANDARDS

- A. Work shall be performed in accordance with applicable federal, state and local fire protection, environmental, building, plumbing, and safety codes and regulations and the latest version of the following industry standards:
1. Material and Property Standard for Grease Interceptors and Clarifiers IAPMO PS 80-2006, International Association for Plumbing and Mechanical Officials, 5001 E. Philadelphia St., Ontario, CA 91761.
 2. 2006 International Plumbing Code, Chapter 10 Traps, Interceptors, and Separators, International Code Council, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001.
 3. Recommended Practices for Installation of Underground Liquid Storage Systems, PEI/RP100-(2005); Petroleum Equipment Institute, P.O. Box 2380, Tulsa, OK 74101.
 4. Installation of Underground Petroleum Storage Systems, API/1615, Cathodic Protection of Underground Petroleum Storage Tank and Piping

Systems, API 1632, American Petroleum Institute, 1220 L Street, Washington, D.C. 20005.

5. Flammable and Combustible Liquid Code, NFPA/30, 2003 Edition, Automotive and Marine Service Station Code, NFPA/30A, National Electrical Code, NFPA/70, and Underground Leakage of Flammable and Combustible Liquids, NFPA/329, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9904.
6. Hazardous Waste Operations and Emergency Response and Excavating, OSHA/29 CFR 1910.120 & 29 CFR 1926 Subpart P., Occupational Safety and Health Administration, U.S. Department of Labor, Region V, 230 S. Dearborn Street, Room 3244, Chicago, IL 60604.
7. Occupational Safety and Health Standards, Flammable and Combustible Liquids, 29CFR 1910.106, Personal Protective Equipment 29CFR 1910 Subpart I, Excavations 29CFR 1926.650 Subpart P, U. S. Department of Labor, Occupational Safety and Health Administration (OSHA), Washington, D.C.
8. Control of External Corrosion of Metallic Buried, Partially Buried, and Submerged Liquid Storage Systems, NACE Recommended Practice RP0285-95; National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77213.
9. UL-58, Standard for Safety, "Steel Underground Tanks for Flammable and Combustible Liquids", 1997, UL-1746, Standard for "Corrosion Protection for Underground Storage Tanks" Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.
10. Underground Storage Tanks; Technical Requirements and State Program Approval; Final Rules, 40 CFR Parts 280 and 281, Part II, Federal Register, Friday, September 23, 1988, Musts for USTs: A Summary of the New Regulations for Underground Storage Tank Systems, and Hazardous Waste Management Standards, Federal Register July 14, 1986. U.S. Environmental Protection Agency, Office of Underground Storage Tanks, 401 M. Street, S.W., Washington, D.C. 20460.
11. The codes and standards listed are the latest as of this publication. Codes and standards are continuously updated. The Contractor shall confirm the construction standard edition enforced by the authority having jurisdiction.

1.4 SUBMITTALS AND DOCUMENTATION

- A. Provide three (3) sets of manufacturer's shop drawings and installation instructions of the interceptors(s) for approval before commencing construction.
 1. Shop Drawings: shop drawings for interceptors shall show principal dimensions and location of all fittings.
 2. Instructions: provide three complete sets of installation, operation, and maintenance instructions with interceptor.
 3. Testing Procedures:
 3. Quality Control: Quality control and inspection procedures and reports shall be considered in the submittal package.
- B. Provide manufacturer's published product data sheets and descriptive material for major components to be provided.

1. Interceptor (s).
 2. Electronic leak detection, gauging, and monitoring system.
 3. Anchoring system.
 4. Manway grade level covers.
 5. Other system accessories – as noted.
- C. Submittals shall be submitted to the Engineer for review and approval. The Engineer shall review the drawings and return them to the Contractor approved, or with appropriate comments.
- D. The Contractor shall furnish the labor, materials, equipment, appliances, services and hauling, and perform operations in connection with the construction and installation of the work. Work shall be as herein specified and as denoted on the accompanying drawings but not limited to the following general terms of work:

1.5 CERTIFICATION

- A. CERTIFICATION: Manufacturer must certify in writing that the Interceptor is designed and approved for the interception and collection of sand, grit, and free oil and grease (hydrocarbons and other petroleum products).
1. Interceptor shall be the standard product of a steel tank manufacturer regularly engaged in the production of identical equipment.
 2. Manufacturer must document history of completion of prior contracts with the identical product.
- B. QUALITY ASSURANCE: The Triple Basin Sand Oil Interceptor shall be manufactured by Highland Tank:

1.6 GUARANTEES AND WARRANTIES

- A. The manufacturer shall provide the following guarantees/warranties:
1. The manufacturer shall warrant its products to be free from defects in material and workmanship for a period of one year from the date of shipment. The warranty shall be limited to repair or replacement of the defective part(s).
 2. HighGuard™ Limited Warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide and install one Highland Tank 750 gallon capacity Model TB OSI - 750 Triple Basin Oil/Sand Interceptor (s) or equal.
- B. Gravity-based oil/sand interceptor shall be constructed of high-strength, mild carbon steel to ASTM specifications and coated inside and outside with high-solids polyurethane.

- C. Interceptor shall be 3' – 6" in diameter and 10' – 9" long; having a total volume of 750 gallons and a sludge holding capacity of 13.5 cubic feet to comply with the requirements of the plumbing code. The sizing and construction of this interceptor is consistent with industry protocols for complying with the sewer pretreatment regulations, therefore an interceptor of smaller volume or multiple, interconnecting vessel construction is not permissible.
- C. Interceptor shall have three (3) compartments to minimize turbulence and promote separation.
- D. Flow to the interceptor shall be by gravity. Interceptor shall retain wastewater long enough to allow sand, grit, and free oil and grease to separate from the water due to their differences in specific gravity. The wastewater will then flow to a sanitary sewer or, be pumped to a recycle wash system, when used at a commercial or municipal vehicle washing facility.
- E. Interceptor shall be installed underground with top access at or above grade level (as specified on drawings).

2.2 DESIGN CRITERIA

- A. The Interceptor shall meet the requirements of the International Association of Plumbing and Mechanical Officials (IAPMO) Material and Property Standard for Grease Interceptors and Clarifiers IAPMO PS 80-2006.1. Tracer tape shall be of inert, acid- and alkali-resistant, polyethylene, four mils thick, six inches wide, suitable for direct burial. Tape shall be capable of stretching to twice its original length.
- B. The Interceptor shall be constructed of high-strength, mild carbon steel, meeting ASTM specifications, with capacities, dimensions, construction, and thickness in strict accordance with Underwriters Laboratories, Subject UL-58 Standard for Safety, Steel Underground Tanks for Flammable and Combustible Liquids, September 30, 1997, Single Wall construction.
- C. The Interceptor's Corrosion Control System shall be in strict accordance with Underwriters Laboratories Inc. Subject UL-1746 Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks and Highland Tank's HighGuard External Corrosion Protection Specifications.1. Tape shall be of inert, acid- and alkali-resistant, polyethylene, five mils thick, six inches wide, with aluminum backing, and have 15,000 psi tensile strength and 80 percent elongation capability. Tape shall be suitable for direct burial.
- D. The Interceptor shall be the standard product of a steel tank manufacturer regularly engaged in the production of such equipment. No subcontracting of Interceptor fabrication shall be permitted.
- E. The Interceptor shall be fabricated, inspected and pressure tested for leakage before shipment from the factory by manufacturer as a completely assembled, single

vessel ready for installation.

- F. The Interceptor shall be cylindrical, horizontal, atmospheric-type steel vessel.
- G. The Interceptor shall have the structural strength to withstand static and dynamic hydraulic loading while empty and during operating conditions.
 - 1. The Interceptor's dimensions and thickness shall be in strict compliance with Roark's Formulas for Stress and Strain as presented in UL 58, September 30, 1997.
 - 2. Calculations, signed and stamped by a Registered Professional Engineer shall be submitted to document structural strength under specified overbearing or external pressure. An interceptor with a reduced shell thickness is not permissible.
- H. The Interceptor shall consist of inlet and outlet connections, internal influent nozzle, fore-basin with heavy duty sludge baffle, fore-basin downcomer positioned to prevent discharge of free oil that has been separated from the water, large sediment and oil pump-out access, mid-basin, mid-basin downcomer, large oil pump-out access, after-basin, after-basin effluent downcomer, wastewater pump mount/access, fittings for vent, sampling, gauging, and lifting lugs.

2.3 GENERAL DESCRIPTION

- A. The Interceptor shall be cylindrical with construction and thickness in strict accordance with Underwriters Laboratories Subject 58, using flat-flanged heads.
- B. The Interceptor shall be a pre-packaged, pre-engineered, ready to install unit consisting of:
 - 1. An influent connection 8-inch, flanged. A factory welded internal influent nozzle at the inlet end of the interceptor. Nozzle discharge to be located at the furthest diagonal point from the effluent discharge opening.
 - 2. A large internal fore-basin to disperse flow and collect separated sand, grit, and oil.
 - 3. A heavy duty sludge baffle to retain sand and grit and prevent them from entering the downcomer.
 - 4. An internal fore-basin downcomer to allow for discharge from the bottom of the fore-basin only.
 - 5. One 24" diameter manhole, UL approved, complete with extension, cover, gasket, and bolts. Manhole shall be placed to facilitate access into fore-basin for solids and oil removal. Heavy duty striker plates shall be placed under the manhole to protect the Interceptor shell during pump-out operations.
 - 6. A large internal mid-basin to collect separated oil.
 - 7. An internal effluent downcomer to allow for discharge from the bottom of the mid-basin only.
 - 8. One 24" diameter manhole, UL approved, complete with extension, cover, gasket, and bolts. Manhole shall be placed to facilitate access into mid-basin for oil removal. Heavy duty striker plates shall be placed under the manhole to protect the Interceptor shell during pump-out operations.
 - 9. A large internal after-basin to collect wastewater for discharge either by pump

- or gravity means.
- 10. An internal effluent downcomer to allow for discharge from the bottom of the after-basin only.
- 11. One 24" diameter manhole, UL approved, complete with extension, cover, gasket, and bolts. Manhole shall be placed to facilitate access into after-basin for (inspection, pumping, cleaning, and access) or (sump pump and controls access). Heavy duty striker plates shall be placed under the manhole to protect the Interceptor shell during pump-out operations.
- 12. A factory welded effluent connection 8-inch, flanged.
- 13. Fittings for cleanout, vent, sampling, and gauge.
- 14. Lifting lugs at balancing points for handling and installation.
- C. Testing Requirements
 - 1. Interceptor tightness testing to UL-58 requirements shall be performed by the manufacturer at the factory.
 - 2. The Interceptor shall be pressure tested at 3-5 psig and all surfaces soaped and carefully inspected for leaks.
- D. Electrically Isolating Exterior Protective Coating
 - 1. After testing, all interior and exterior surfaces shall be grit blasted per Steel Structures Painting Council Surface Preparation Specification SSPC-SP-6 Commercial Grit Blast Cleaning with an angular profile of 2.0 mils.
 - 2. Exterior surfaces: Apply HighGuard Corrosion Protection System consisting of:
 - a. Application of 75 mils DFT self-reinforcing, high-solids polyurethane material complying with the following specifications:
 - 1) Property/Value
 - a). Hardness (ASTM D 2240): 70 Shore D
 - b). Temperature Range: 35-120°F (1-49°C)
 - c). Impact Strength: >40 in. lbs
 - d). Flexibility: 15 mils bent 180 over 1/8" (3 mm) mandrel
 - e). Abrasion Resistance: 110 mg (C17, 1 kg, 100 cycles)
 - b. A 15,000-volt spark test shall be performed in the factory to ensure coating integrity.
 - 3. Internal surfaces: Apply 15 mils DFT Polyurethane Lining.
 - a. Lining shall be of a light color to aid in visual inspection of the interior.
- E. Interceptor Hold Down Anchoring
 - 1. Interceptor shall be provided with polyester hold down straps and turnbuckles. Number and size as recommended by manufacturer.
 - 2. Provide float out and anchorage calculations, signed and stamped by a registered professional engineer, to document proper burial depth and anchoring to counteract the Interceptor's buoyant forces.
 - 3. Provide 2 concrete deadmen anchors as required. Number and size are as recommended by manufacturer.
 - 4. If a reinforced concrete pad is required for anchoring purposes, the pad dimensions are shown on the drawings.
 - 5. Note: An 8" minimum reinforced concrete pad is required on for all interceptors 10'0" diameter and larger.

F. Labeling

1. Identification plates: Plates to be affixed in prominent location and be durable and legible throughout equipment life.
2. Each Interceptor shall be permanently labeled on the Interceptor head with pertinent handling, safety, and installation instructions.

G. Grade Level Manways

1. Provide three 36" manway rings with H-20 rated steel cover for access to Interceptor manways.

2.4. OPTIONS/ACCESSORIES

A. Interceptor shall be furnished with (select all that apply):

1. None.

PART 3 - EXECUTION

3.1 TRANSPORTATION TO SITE

- A. Manufacturer shall take extreme care in protecting the Interceptor coating when transporting the Interceptor to the delivery site. Padding between the truck and Interceptors, and padding on the chains should be utilized.

3.2 INTERCEPTOR OFF-LOADING, HANDLING, AND STORAGE

- A. Interceptor shall be handled, lifted, stored, and secured in accordance with the manufacturer's instructions.
- B. Unload with equipment having sufficient lifting capacity to avoid damage to the Interceptor.

3.3 INTERCEPTOR INSTALLATION

- A. Refer to manufacturer's label on the Interceptor head and submitted User's Manual for pertinent handling, safety, and installation instructions.
- B. The Interceptor excavation shall be free from material that may cause damage to the Interceptor coating. Care shall be taken during installation that foreign matter is not introduced into excavation or backfill. The bottom of the excavation shall be covered with clean sand or gravel to depth shown on the drawings suitably graded and leveled. NOTE: If Interceptor is to be placed on a concrete pad for anchoring purposes, the Interceptor must not be placed directly on the pad. A layer of fine or pea gravel, sand or #8 crushed stone (#8 coarse aggregate ASTM D-448) at least 6" deep must be spread evenly over the dimensions of the pad to separate the Interceptor from the pad. If installation area is in a tidal area, the Interceptor "bedding" material should be fine gravel or pea gravel rather than sand.

- C. If an air test of the Interceptor above ground is required. Pressure should not exceed 5 psi while a bubble solution is applied to welded seams. Refer to instructions on side of Interceptor or per PEI/RP100-(2005).
- D. Before placing the Interceptor in the excavation, all dirt clods and similar foreign matter shall be cleaned from the Interceptor, and areas of coating damage shall be repaired with a compatible coating supplied by the manufacturer.
- E. Equipment to lift the Interceptor shall be of adequate size to lift and lower the Interceptor without dragging and dropping to ensure no damage to the Interceptor or the coating. Interceptor shall be carefully lifted and lowered by use of cables or chains of adequate length (not less than 45 including angle) attached to the lifting lugs provided. A spreader bar should be used where necessary. Under no circumstances use chains or slings around the Interceptor shell.
- F. Backfill consisting of sand, #8 crushed stone (#8 crushed aggregate ASTM D-448) or fine gravel, shall be placed along bottom side of Interceptor by shoveling and tamping to ensure the Interceptor is fully and evenly supported around bottom quadrant. The backfill shall be deposited carefully around Interceptor and to a depth over Interceptor to avoid damage to coating.
- G. The shipping plugs at unused Interceptor openings shall be removed, a pipe compound shall be added, and permanent plugs shall be reinstalled in the unused openings. The dielectric bushings or flange isolation devices shall not be removed from openings. The plugs in Interceptor openings, which are to be used, should not be over tightened as this may cause the bushing to unscrew with the plug. Care should be taken not to cross-thread or damage the non-metallic bushings when replacing plugs or installing required Interceptor piping.

3.4 ON SITE SUPERVISION/TRAINING

- A. Manufacturer will provide classroom training on a "per day" bid basis on recommended Interceptor installation procedures. This training will include the manufacturer's recommended installation procedures.
- B. Manufacturer shall provide a qualified representative for on-site supervision assistance of Interceptor installation or any other assistance that may be required by the facility personnel at the site. Manufacturer will bid on this supervision on a "per day" basis in a separate bid item.

+ + END OF SECTION + +

Geotechnical Report

**Town of Clarkstown – Highway Department
Expansion
12 Seeger Drive, Nanuet, New York 10954**

Prepared For:

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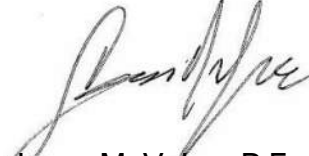
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1 Introduction

1.1 General

At the request of the Town of Clarkstown Highway Department (Client), M.G. McLaren Engineering and Land Surveying, P.C. (McLaren) has developed and implemented a Geotechnical Investigation Program to evaluate the underlying subsurface conditions at the site of 12 Seeger Drive, Nanuet, New York 10954, hereinafter referred to as the “site”. The geotechnical evaluations and recommendations presented herein are in accordance with the 2020 Building Code of New York State. This geotechnical investigation consisted of soil borings, identification, and classification of soil stratigraphy.

We understand that survey plans are still in the process of being prepared for this project. Applicable plans and elevations can be updated in a revised final report once the survey drawings become available.

See Appendix A for the Site Location Map for the site.

1.2 Proposed Development

Based on the information provided to us at the time of this report, we understand the Town of Clarkstown is interested in expanding their current garage warehouse space with an addition which will occupy a footprint area of approximately 17,500 square feet (sf). This work will require the demolition of the existing overhang structure on the south side of the existing building.

1.3 Scope of Work

The Scope of the Geotechnical Investigation for the project site included the following tasks:

- i) Establish an investigative program to determine the soil strata and properties, which included exploratory soil borings.
- ii) Evaluate the findings of the borings and monitoring wells to define the characteristics of the underlying soil strata.
- iii) Evaluate geotechnical information to determine project-specific needs.
- iv) Provide recommendations for foundation design and below-grade elements pertaining to the proposed construction.
- v) Prepare a Geotechnical Report in conformance with NYS Building Code, 2020 Edition.

2 Field Investigation

Geotechnical Subsurface Investigation

A total of five (5) geotechnical borings and two (2) monitoring wells were advanced on the site between March 22nd and March 24th, 2023. Borings were inspected full-time by a McLaren field engineer and were advanced to end depths between 17.0 to 75.0 feet below the existing ground surface elevation. The Boring Location Plan is shown in Appendix B.

McLaren retained the services of Craig Geotechnical Drilling (5230 Atlantic Ave, Mays Landing, NJ 08330) for drilling borings using a truck-mounted drilling rig. The borings were advanced using mud rotary techniques with a 3.875 diameter tri-cone roller bit and 4-inch inner diameter casing. Soil samples were obtained continuously to a depth of 12 feet and at five-foot intervals thereafter in all test borings in accordance with the American Society for Testing and Material (ASTM) Standard D1586. The Standard Penetration Test (SPT) consists of driving a standard 2-inch outside diameter (OD) split spoon sampler for a depth of 24-inches with repeated blows of a 140-pound hammer free-falling 30 inches. The standard penetration, or N-value, is defined as the number of blows required to drive the sampler for a 12-inch interval after an initial 6 inches of penetration and is measured in blows per foot (bpf). Soil samples obtained from the borings were visually classified in the field using the Modified Burmister soil classification system, the Unified Soil Classification System (USCS) and the 2020 Building Code of New York State designations.

Two (2) groundwater monitoring wells were installed in borings B-1(OW) and B-3(OW) to a depth of 19 (Boring termination depth) and 25 feet below grade, respectively. Groundwater monitoring wells were installed on March 22nd, and were monitored for the duration of the project.

Rock coring was performed on Boring B-4 using a 5-foot-long NQ core barrel in accordance with ASTM Standard D2113. Recovered rock cores were described using the Modified International Society for Rock Mechanics (ISRM) system. The top of bedrock was estimated based on drilling operations (e.g., excessive rig chatter or difficult penetration) and practical split spoon refusal, as indicated by blow counts greater than 100 for a 6-inch interval on the split spoon sampler. Rock coring was performed to confirm the presence of bedrock (instead of intercepting a boulder), and to assess its relative quality as indicated by Core Recovery and the Rock Quality Designation (RQD) in accordance with ASTM Standard D6032. The rock description, core recovery and RQD are noted on the boring logs. The RQD for each run is calculated at the summation of intact core pieces 4-inches or more in length divided by the total length of the core run. Material classes have been provided for the rock samples in accordance with the 2020 New York State Building Code.

Upon completion, the test borings were backfilled with soil cuttings for safety.

The boring logs and well construction logs are included in Appendix C and Appendix D, respectively.

3 Existing Conditions

3.1 Surface Conditions

The geotechnical investigation was conducted within the footprint of the proposed enclosed expansion structure and the surrounding parking area. Boring locations are shown on a sketch included in Appendix B.

3.2 Subsurface Conditions

The primary subsurface strata encountered are described as follows. It should be noted that at the time of issuing this report, survey plans are still in the process of being prepared. Therefore, the site elevations at the boring locations have not been included in this report. Based on site observations and aerial images, we would approximate Borings B-3 (OW), B-4 and B-5 to be at about the same elevation (varying by 2 feet +/-), and Borings B-1 (OW) and B-2 at about the same elevation. Once survey drawings become available, we can re-evaluate these assumptions.

The subsurface strata encountered during the subsurface exploration program are as described below.

- **Topsoil** – A 4-inch-thick topsoil cover was encountered in Boring B-3.
- **Concrete Course** – A concrete surface course was encountered in all Borings except Boring B-3 (OW) and was approximately 2 to 4 inches in thickness.
- **Fill (SP)** – A layer of Fill material was encountered in all borings directly below the surface and extended to depths of approximately 4 feet below grade. The Fill material generally consists of medium- to fine-grained Sand, containing up to 10 percent gravel and up to 10 percent silt. The Fill layer was loose to very dense in compaction with N-values ranging from 6 blows per foot (bpf) to 50 blows over 2 inches and an average N-Value of about 28 bpf. It should be noted that cobbles and concrete fragments were encountered during drilling which likely inflated the blow counts.
- **Upper Silt (ML)** – Below the Fill layer, a stratum consisting of brown to gray, Silt, containing up to 20 percent sand, and up to 10 percent gravel and less than 10 percent clay was encountered in Borings B-1 (OW), B-2, and B-4. The Silt layer was encountered to depths of approximately 4 feet to 10 feet below ground surface and was approximately between 1 foot (Boring B-2), to 6 feet (Boring B-4) in thickness. The layer was generally medium dense to dense in compaction with N-Values ranging from 12 to 32 bpf and an average N-Value of about 20 bpf.
- **Silty Sand with Gravel (SM/SP/SC)** – Below the Upper Silt and Fill layers, a stratum consisting of a brown to gray, fine to medium Sand, containing between 10 to 31 percent silt and up to 24 percent gravel and less than 10 percent clay was encountered in all borings. The silty sand layer extended to depths of approximately 20 feet (Boring termination depth) to 70 feet below ground surface

and was approximately a 10- to 20-foot-thick layer. The layer was varying in compaction from medium dense to very dense with N-Values ranging from 10 to 104 bpf (i.e., refusal) and an average N-Value of approximately 63 bpf.

In Boring B-2, an approximately 4-foot-thick layer of gray, medium- to fine-grained sand was encountered between the Fill layer and the upper Silt layer. This layer was gray in color and generally medium dense in compaction, with N-Values ranging from 14 to 22 bpf, and an average N-Value of 18 bpf.

- **Gravel with Boulders & Cobbles (GP)** – In Borings B-1 and B-4, auger refusal was encountered between 17 and 30 feet below grade and was initially misconstrued as top of bedrock. The presumed rock was cored at Boring B-4, and the assumption was negated upon recovery of the core sample due to the low sample recovery. Split spoon sampling in this stratum was very difficult due to the obstructions encountered and yielded N-values greater than 50. The core barrel was advanced in two 5-foot runs from 20 to 30 feet at Boring B-4 to penetrate this layer and to continue advancing using the mud rotary drilling method.
- **Lower Silt/Till (ML)** – In Boring B-2, a stratum consisting of a gray and brown Silt with trace amounts of Sand, Clay and Gravel was encountered. This layer extended to boring termination depth of about 70 feet where auger refusal was encountered and was approximately 15 feet in thickness. The layer was very dense in compaction with N-Values ranging from 51 to 126 bpf and an average N-Value of approximately 94 bpf.
- **Sandstone Bedrock** – In Boring B-4, auger refusal was encountered on bedrock at about 70 feet below the ground surface elevation. Rock coring was performed from 70 to 75 feet and the recovered rock core sample was observed to consist of fine-grained, severely fractured, completely weathered, weak Sandstone. The Rock Quality Designation (RQD) of the recovered core was calculated to be about 21.6 percent, indicating a soft rock.

3.3 Groundwater

During the investigation, two (2) temporary monitoring wells were installed on site to measure groundwater levels at the site location. Monitoring wells were installed in Borings B-1 and B-3 to depths of 19 and 25 feet below grade, respectively. The wells were installed on March 22nd and were monitored until completion of the site investigation on March 24th. Groundwater was generally encountered at depths of 5 to 13 feet below grade during the drilling operations, however groundwater was measured as depths of 3.2 and 3.7 feet below grade in the groundwater observation wells after a stabilization period of 24 hours.

The rise in groundwater level after drilling could be due to a buildup of artisan pressure below a confining layer, such as the Silt or Silty Sand layers encountered during the investigation. Soils with fines contents greater than 20 percent generally have very low permeability and could therefore prevent the free flow of groundwater through the soil substratum. Based on these observations, groundwater measured in the observation wells

could represent a perched condition, where static groundwater is likely at a depth of 8 to 10 feet. However, due to the measurements at the site we recommend that a groundwater depth of 3.0 feet should be conservatively used for design.

It should be noted that changes to groundwater elevation may occur due to seasonal influences, precipitation amounts, local pumping, utility leakage, and other factors different from those existing at the time observations were made.

Table 1 provides a summary of the boring data, including encountered strata, depth of Fill layer, groundwater information, and boring termination depths. The boring locations and the corresponding boring logs and well construction logs are included in Appendix C and Appendix D of this report, respectively.

Table 1 – Summary of Subsurface Investigations

Boring ID	Thickness of Fill Layer	Groundwater Depth (ft)		Depth to Auger Refusal	Depth to End of Boring (ft)	RQD (%)
		At the Time of Drilling	After Drilling			
B-1 (OW) ⁽¹⁾	4.0	8.0	3.7	19.0	17.0	- ⁽²⁾
B-2	4.0	7.0	-	35.5	35.5	-
B-3 (OW)	4.0	10.0	3.2	30.5	30.5	-
B-4	4.0	5.0	-	70.0	75.0	21.6
B-5	4.0	13.0	-	22.5	21.5	-

(1) Denotes Observation Well.

(2) Where cells marked as "-", information does not apply.

3.4 Soil Laboratory Testing

Geotechnical laboratory testing was performed on selected samples collected during the subsurface exploration. The purpose of the geotechnical laboratory testing was to confirm field soil classification and to define mechanical and physical soil properties for use in the foundation design and construction recommendations.

The geotechnical laboratory testing consisted of four (4) disturbed samples for sieve analyses performed in accordance with ASTM Standard D6913, Atterberg Limits in accordance with ASTM D4318, moisture content in accordance with ASTM C556, and sieve analysis and two (2) hydrometer tests in accordance with ASTM Standard D422.

The geotechnical laboratory results are included in Appendix E, and the results are summarized in Table 2.

Table 2 – Laboratory Test Results

Sample ID	Percent Passing #200 Sieve (%)	Atterberg Limits (Liquid Limit, Plastic Limit, Plasticity Index)	Moisture Content (%)	USCS Symbol	USCS Group Name
B-3, S-3 (4'-6')	20	N/A, N/A, NP	10.9	SM	Silty Sand with Gravel
B-3, S-8 (20'-22')	38	N/A, N/A, N/P	7.9	SM	Silty Sand with Gravel
B-4, S-5 (8'-10')	41	N/A, N/A, N/P	10.8	SM	Silty Sand with Gravel
B-5, S-5 (8'-10')	31	N/A, N/A, NP	6.6	SM	Silty Sand with Gravel

3.5 Depth of Fill

A Fill layer was encountered during the subsurface investigation to about 4 feet below grade. Generally, the fill stratum is unsuitable for bearing and should be removed and replaced with imported material at bearing location as specified in Sections 6.3 and 6.4 of this report.

4 Analysis and Recommendations

4.1 Foundation Support

The foundation recommendations provided herein are only valid for the structural conditions we were notified of at the time of issuing this report. If additional capacity for proposed structures is required, the geotechnical engineer should be notified to recommend an alternate design to support the proposed site developments.

For newly constructed foundations proposed for the enclosed expansion structure, McLaren recommends shallow spread footings supported on the natural medium dense Silty Sand stratum, or upon structural fill or $\frac{3}{4}$ " stone placed atop the Silty Sand stratum. Based on the results of the subsurface exploration at Borings B-3 through B-5, the subsurface stratum consists of Fill material underlain by a medium dense Silty Sand stratum. The Fill stratum was encountered to a depth of about four (4) feet below surface elevation in all borings and should be considered unsuitable for support of structural foundation loads. McLaren recommends a maximum allowable net bearing pressure of 2 tons per square foot be used for any foundations bearing on either the natural subgrade or on structural fill or $\frac{3}{4}$ " crushed stone placed atop the underlying Silty Sand stratum. All subgrades and imported fill material shall be placed and compacted in accordance with the recommendations presented in section 6.3 and 6.4 of this report.

Shallow footings shall extend to a depth of four (4) feet below grade for frost protection, or as outlined by the requirements of the governing municipality. McLaren recommends that footing subgrades be over excavated by a minimum of six (6) inches and replaced with crushed $\frac{3}{4}$ " stone to allow water to flow freely from under foundations.

It is recommended that new foundations erected directly adjacent to existing foundations be constructed to bear at an elevation level with the existing foundations.

4.2 Settlement

Foundations bearing on the in-situ medium dense Silty Sand or on structural fill are expected to have minimal settlements, both long and short term. The expected settlement of the foundations should not exceed 0.5 inches. Anticipated differential settlement should not be more than half this value.

4.3 Lateral Design Considerations

We understand that the proposed development does not include below grade structures, however we have provided soil parameters for lateral earth pressure coefficients for use. The lateral earth pressures will be dependent on the type of backfill utilized. In case of the presence of below grade elements, we offer the following design parameters:

Table 3 – Recommended Lateral Design Parameters ^{(1), (2)}

Soil Parameter	Fill (SP)	Silty Sand (SM/SP)	Structural Backfill
Total Unit Weight of Soil (pcf)	100	115	120
Angle of Internal Friction (°)	28	30	34
Cohesion (psf)	0	0	0
Active Earth Pressure Coefficient (K_a)	0.36	0.33	0.28
At-Rest Earth Pressure Coefficient (K_0)	0.53	0.50	0.44
Passive Earth Pressure Coefficient (K_p)	2.76	3.00	3.56
Coefficient of Friction	0.29	0.29	0.36

(1) Only non-clay and non-silt soil can be reused, and soils must have a maximum of 15% passing the #200 sieve.

(2) Earth pressures and friction coefficients are given for a vertical wall with no back slope.

In the event that concentrated loads are located in the vicinity of the open excavations, we recommend that the potential for additional lateral pressures on the below grade elements be evaluated. We recommend that any below grade walls adjacent to roadways or parking areas be designed for a uniform surcharge of 250 psf at the ground surface. The use of heavy compacting equipment within 10 feet of open excavations, if any, should be prohibited.

4.4 Floor Slab Recommendations

New floor slabs can be constructed as slab-on-grade and should be supported on structural fill. In areas where slabs-on-grade will be erected, a minimum of 18 inches of the existing fill layer should be removed and replaced with structural fill.

Compacted granular fill shall meet the gradation requirements and compaction requirements specified in this report. Floor slabs-on-grade should be designed using a unit modulus of subgrade reaction of 120 pounds per cubic inch, referenced to a 1-foot by 1-foot square plate area. The recommended modulus value is contingent on subgrade preparation work being performed as described in this report. McLaren should be informed if non-typical loading is to be placed on slabs-on-grade. Non-typical loading includes, but is not limited to, heavy point loads and vibratory loads.

A 6-inch crushed stone base course should underlie the floor slabs-on-grade. The crushed stone shall meet the gradation requirements specified in Table 4.

4.5 Waterproofing

Due to the presence of the perched ground water table at a depth of about 3.5 feet below grade, we recommend all below-grade elements should be fully waterproofed in order to minimize water infiltration. The waterproofing manufacturer should perform laboratory testing to confirm the compatibility of the waterproofing material with the foundation soils and submit a certificate of compliance to the Owner. The Contractor installing the waterproofing shall be approved by the waterproofing manufacturer to ensure the waterproofing system will be installed properly. Waterproofing will need to be carefully planned and installed in sections and in conjunction with the foundation operations to ensure full integrity of the installed waterproofing. Waterproofing shall be in accordance with the New York State Building code section 1805.3.

4.6 Soil Testing Special Inspections

Special inspections and testing of existing site soil conditions, fill placement and load-bearing requirements shall be performed in accordance with the 2020 Building Code of New York State Section 1705.6. All testing should be done by a qualified special inspection agency and should verify all field conditions match the approved geotechnical report and construction documents prepared by the registered design professional prior to placement of concrete.

5 Seismic Design Considerations

The proposed expansion must be designed in accordance with the 2020 Building Code of New York State, Section 1613, Earthquake-Loads. A warehouse superstructure is Occupancy Category I/II (see Table 1604.5). Based on the above values and the 2020 New York State Building Code Tables 1613.2.5(1) and 1613.2.5(2), we recommend that the proposed structure be designed to Seismic Design Category “B” and Seismic Site Class “D” In accordance with Section 1613 of the 2020 New York State Building Code.

6 Construction Recommendations

6.1 Site Preparation

Site preparation should begin with demolition of the existing overhang structure, as well as removal of the existing pavement and excavation to the proposed foundation bearing elevation. Existing utilities within the site footprint should be relocated or removed prior to construction as required.

The Contractor shall always be responsible for conducting all earthwork operations in a safe and prudent manner such that all workmen and the general public will be protected from hazards. The Contractor shall observe all applicable local, State and/or Federal requirements.

Before commencing fill placement activities, the exposed fill subgrades should be compacted to a stable and firm consistency with a minimum of four passes of a vibratory walk behind double drum roller, or other large compaction equipment. Areas of unstable ground observed during proof-rolling evidenced by pumping, weaving, or rutting, should be scarified, dried and recompact, or over-excavated until the exposed ground is stable and firm and replaced with new compacted granular fill meeting the gradation requirements of Section 6.3. Compaction methods should be performed in accordance with Section 6.4 of this report.

Subgrades shall be inspected and tested to consist of a free-draining, granular material with less than 15% passing the #200 sieve. Subgrades should be kept free of standing water, debris, and ice. Subgrades should be protected from frost and fill should not be placed over frozen soil. If frozen soils are present at design subgrade levels, they should be removed and replaced with new compacted granular fill.

6.2 Reuse of Excavated Materials

If the on-site excavated materials should conform to the requirements outlined Section 6.3 of this report, it may be reused as fill material. Prior to re-use, the excavated material should be culled of organics, boulders, construction debris and other deleterious materials and can be adequately compacted. If the onsite fill is desired to be reused, any gravel larger than 3-inches should be removed prior to being reused.

Any soils found to contain contaminants shall be safely disposed of in accordance with all local, State, and Federal standards. Silt, clay, and urban fill soils are not suitable to be reused.

6.3 Structural Fill

All structural fill soil should consist of soils which are predominately sand and gravel with no more than 10% passing the #200 sieve and have no particle greater than 3 inches, containing no evidence of trash, debris, vegetation, roots, peat or other deleterious

materials or environmental contaminants; and should be approved by the Geotechnical Engineer prior to placement.

We recommend performing at least one gradation and one moisture-density test per each 100 cubic yards of fill imported to the site. Crushed stone, where used below proposed slabs, should be compacted to a firm, stable configuration, and should be wrapped all around in non-woven filter fabric, such as Mirafi 140N or equivalent.

Any excess soil should be disposed of off-site in accordance with any applicable local, State, and Federal regulations.

Crushed stone used as backfill should conform to the gradation requirements as outlined in the following table.

Table 4 – Crushed Stone Gradation

Sieve Size	Percent Finer by Weight
1 inch	100
3/4 inch	90 – 100
1/2 inch	10 – 50
3/8 inch	0 – 20

6.4 Compaction

Fill sections shall be constructed of acceptable material and deposited in successive lifts with a loose thickness of each lift not to be more than eight (8) inches before compaction. The soil shall be compacted to the maximum dry density obtained in the lab (ASTM D-698) as follows:

Table 5 – Subgrade & Fill Compaction Requirements

Location	Percent of Maximum Laboratory Density
Below Structures and Pavement	95
All Other Areas	92

Installation of fill should be performed under the supervision of a qualified Geotechnical Engineer. See landscape architect specification for compaction for landscaped areas.

6.5 Monitoring of Adjacent Structures

Due to the close proximity of existing structures to the proposed expansion, McLaren recommends the assessment and monitoring of adjacent structures during the foundation operations. The assessment and monitoring of adjacent structures should consist of documentation of the conditions of adjacent structures prior to commencing the foundation work or construction, and monitoring of structures during operation.

The pre-construction condition of adjacent structures should be documented prior to the start of any work at the project site. This includes photographing and measuring all existing conditions and defects to provide a quantifiable baseline record prior to construction. Crack gauges, vibration monitors and/or survey points should be installed at applicable locations, and baseline values should be recorded. Crack readings, vibration

measurements, and deflections should be measured throughout foundation work and construction. This work must be performed on behalf of the Owner, not the Contractor.

6.6 Temporary Groundwater Control

During the investigation, static groundwater was observed between 5 to 13 feet below ground surface elevation. Following the installation of the observation wells and a stabilization period of 24 hours, the water table was observed to have risen to a level of about 3 feet below grade. If proposed excavations extend to a depth of 3 feet or below, local dewatering may be required. Such dewatering techniques may be accomplished through the use of sump pumps or localized well points. Localized dewatering may also be required to remove precipitation that collects in the excavation area. Any ponded water should be evacuated to avoid disturbing subgrades and so that controlled fill materials are placed in dry conditions.

In the event that construction dewatering is required, it is recommended that the groundwater is maintained at an elevation at least 2 feet lower than the excavation bottom elevation. This system will need to be designed by a specialty subcontractor based on the site conditions, the planned excavation extents, and the data presented in this report. A treatment system may be required to treat and control the discharge of dewatering effluent. Care will be needed with the dewatering design and implementation to avoid settlement of the existing structures, as well as any utilities. Excavation below groundwater in the sandy soils typical of the site will lead to excavation instability and collapse.

Excessive dewatering may negatively impact existing building foundations – leading to non-uniform settlement. Lowering the groundwater levels at any site will increase the effective stress on the underlying soils due to the reduction in buoyancy. The increased stress levels lead to consolidation settlement – and is more pronounced in clays and silty soils. We recommend limiting the dewatering to a depth of 2 feet below excavation subgrade levels.

Temporary groundwater discharge permits will be required from NYSDEC for any dewatering operations. The project environmental consultant should provide input regarding the quality of the groundwater in and around the site and advise if treatment is required.

6.7 Excavation & Temporary Soil Support

The Owner and the Contractor should make themselves aware of and become familiar with applicable local, State, and Federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our Client. Under no circumstances should the information provided herein be interpreted to mean that McLaren is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and shall not be inferred.

The Contractor should be aware that slope height, slope inclination, or excavation depth should in no case exceed those specified in local, State, or Federal safety regulations, such as OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility Subcontractors could be liable for substantial penalties.

For excavations that are required to be sheeted and shored, the Contractor shall submit working drawings and calculations for the design of the sheeting and shoring system. The drawings and calculations shall be signed and sealed by a Professional Engineer registered in the State of New York.

This report has been respectfully submitted in accordance with the request of the Town of Clarkstown Highway Department and is, to the best of our knowledge, accurate and complete. Any questions regarding its content should be addressed to: M.G. McLaren Engineering and Land Surveying, P.C., 131 West 35th Street, 3rd Floor, New York, NY 10001.

\\nydata01\Projects\Proj210\210883\8_Technical\Reports\Geotechnical Report\2023-04-19- Town of Clarkstown - Highway Department Expansion Geotechnical Report.docx

LIMITATIONS

A. Subsurface Information

Locations: The locations of the explorations were approximately determined by tape measurement from visual features shown on the plans provided to us. Elevations of the explorations were approximately determined by interpolation between contours shown on topographic plans provided to us by the site engineer. The locations and elevations of the explorations should be considered accurate only to the degree implied by the method used.

Interface of Strata: The stratification lines shown on the individual logs of the subsurface explorations represent the approximate boundaries between soil types, and the transitions may be gradual. The stratum lines shown on soil profiles are based upon interpolation between explorations and may not represent actual subsurface conditions.

Field Logs/Final Logs: A field log was prepared for each exploration by a member of our staff. The field log contains factual information and interpretation of the soil conditions between samples. Our recommendations are based on the final logs as shown in this report and the information contained therein, and not on the field logs. The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and/or tests of the field samples.

Water Levels: Water level readings have been made in the explorations at times and under conditions stated on the individual logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater will occur due to variations in rainfall, temperature, and other factors.

Pollution/Contamination: Unless specifically indicated to the contrary in this report, the scope of our services was limited only to investigation and evaluation of the geotechnical engineering aspects of the site conditions, and did not include any consideration of potential site pollution or contamination resulting from the presence of chemicals, metals, radioactive elements, etc. This report offers no facts or opinions related to potential pollution/contamination of the site.

Environmental Considerations: Unless specifically indicated to the contrary in this report, this report does not address environmental considerations which may affect the site development, e.g., wetlands determinations, flora and fauna, wildlife, etc. The conclusions and recommendations of this report are not intended to supersede any environmental conditions which should be reflected in the site planning.

B. Applicability of Report

This report has been prepared in accordance with generally accepted soils and foundation engineering practices for the exclusive use of Town of Clarkstown, Highway Department, and its agents for specific application to the proposed developments at the site of Town of

Clarkstown Highway Department located at 12 Seeger Drive, Nanuet, NY 10954. No other warranty, expressed or implied, is made.

This report may be referred to in the project specifications for general information purposes only but should not be used as the technical specifications for the work, as it was prepared for design purposes exclusively.

C. Reinterpretation of Recommendations

Change in Location of Nature of Facilities: In the event that any changes in the nature, design or location of the building are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

Changed Conditions During Construction: The analyses and recommendations submitted in this report are based in part upon the data obtained from five widely spaced test borings and three percolation test locations for this study. The nature and extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

Changes in State-of-the-Art: The conclusions and recommendations contained in this report are based upon the applicable standards of our profession at the time this report was prepared.

D. Use of Report by Prospective Bidders

This soil and foundation engineering report was prepared for the project by M.G. McLaren Engineering & Land Surveying Group, P.C. for design purposes and may not be sufficient to prepare an accurate bid. Contractors utilizing the information in the report should do so with the express understanding that its scope was developed to address design considerations. Prospective bidders should obtain the owner's permission to perform whatever additional explorations or data gathering they deem necessary to prepare their bid accurately.

E. Construction Observation

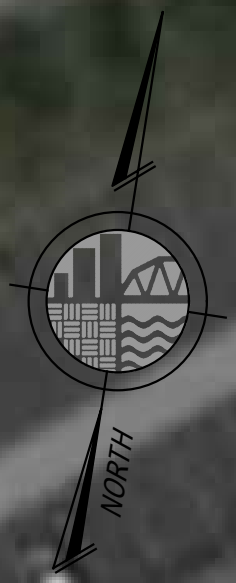
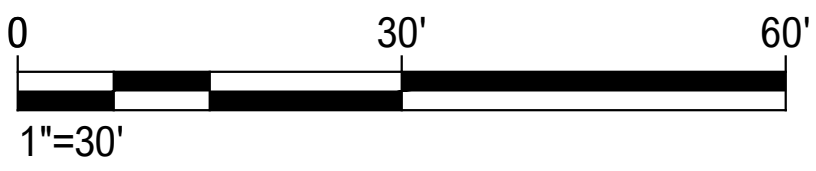
We recommend that a qualified geotechnical engineer be retained to provide on-site soils engineering services during the earthwork construction and foundation phases of the work. This is to observe compliance with the design concepts and to allow changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Appendix A – Site Location Plan

\\nydata01\Projects\Proj210\210883\10_Dwgs\CADD\Sketches\Boring Location Plan\Clarkstown Site Location Plan_04.12.23.dwg PLOT TIME: Thursday, April 13, 2023 - 5:35 PM BY: Michael Garcia



NOTES:
1. IMAGE TAKEN FROM GOOGLE EARTH, DATED 04/2022




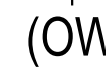
PROJECT NO. 210883	
SCALE 1:30	
DATE 3/28/2023	
DRAWN BY MG	
CHECKED BY SR	
DRAWING NO. SK-1	
OF SHTS	
PROJECT TITLE SITE LOCATION PLAN	
SEAL	
PROJECT CLARKSTOWN HIGHWAY DEPARTMENT	
NEW YORK	
NANUET	
M. G. McLaren Engineering and Land Surveying P.C. 530 Chestnut Ridge Road Woodcliff Lake, NJ 07677 T: 201.775.6000 www.mgmlaren.com	
McLaren ENGINEERING GROUP	
REVISION	
DATE	
NO	
BY	

Appendix B – Boring Location Plan

FILE NAME: \\nydata01\Projects\Proj210\210883\10_Dwgs\CADD\Sketches\Boring Location Plan\Clarkstown Boring Location Plan_04.13.23.dwg PLOT TIME: Thursday, April 13, 2023 - 4:58 PM BY: Michael Garcia



LEGEND:

-  BORING LOCATION AND TERMINATION DEPTH
-  (OW) — OBSERVATION WELL

NOTES:

- GEOTECHNICAL INVESTIGATION WAS PERFORMED BY CRAIG TEST BORING CO. INC BETWEEN 3/22/2023 TO 3/24/2023. OBSERVED BY M.G. MCLAREN ENGINEERING AND LAND SURVEY, P.C.
- BACKGROUND TAKEN FROM GOOGLE EARTH, DATED 04/2022. SURVEY PLANS WERE NOT AVAILABLE AT THE TIME OF PREPARING THIS DRAWING.
- BORING LOCATIONS WERE DETERMINED USING HAND-HELD, COMMERCIAL-GRADE GPS AND MEASUREMENTS FROM EXISTING SITE FEATURES, AND ARE ACCURATE TO APPLICABLE DEGREES.

PROJECT NO. 210883	
SCALE 1:20	
DATE 03/28/2023	
DRAWN BY MG	
CHECKED BY SR	
DRAWING NO. B-1	
OF SHTS	

PROJECT	
CLARKSTOWN HIGHWAY DEPARTMENT	NEW YORK
NANUET,	

McLaren ENGINEERING GROUP	
M. G. McLaren Engineering and Land Surveying P.C.	
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Woodcliff Lake, NJ 07677	
T: 201.7756000 www.mgclaren.com	

NO.	DATE	REVISION	BY

Appendix C – Boring Logs



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BORING NUMBER B-1 (OW)

PAGE 1 OF 1

CLIENT	Town of Clarkstown - Highway Department	PROJECT NAME	Clarkstown Highway Facility Expansion
PROJECT NUMBER	210883	PROJECT LOCATION	Nanuet, NJ
DATE STARTED	3/22/23	COMPLETED	3/22/23
DRILLING CONTRACTOR	Craig Drilling Co.	GROUND ELEVATION	
DRILLING METHOD	Mud Rotary Drill Bit	HOLE SIZE	4 inches
LOGGED BY	MG	GROUND WATER LEVELS:	
CHECKED BY	CLL	AT TIME OF DRILLING	8.00 ft
NOTES	Concrete approx. 2"	AT END OF DRILLING	---
		AFTER DRILLING	3.75 ft

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/13/23 11:40 - P:\PROJ2102108838 TECHNICALREPORTS\GEO\TECHNICAL REPORT\GINT\CLARKSTOWN HIGHWAY DEPARTMENT BORING LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
	SS 1	100	60-25-24-23 (49)	SP		Concrete (4") (SP) Black/gray, dense, medium to fine SAND, little fine Gravel, trace Silt, fragments of Concrete, dry (24")(FILL)
	SS 2	100	30-17-8-5 (25)	SP		(SP) Light brown, medium dense, medium to fine SAND, little fine Gravel, trace Silt, trace Cobbles, dry (24")(FILL)
5	SS 3	100	5-7-5-10 (12)	ML		(ML) Gray, medium dense, SILT, little Clay, little fine Sand, trace fine Gravel, moist (24")
	SS 4	100	14-12-10-10 (22)	ML		(ML) 9"-Grayish brown, medium dense, SILT, little Clay, little fine Sand, trace fine Gravel, v.moist 15"-Dark brown, medium dense, SILT, some fine Sand, trace fine Gravel, trace Clay, v.moist (24")
	SS 5	63	20-14-18-19 (32)	ML		(ML) Brown, dense, dense, SILT, some fine Sand, trace fine Gravel, trace Clay, wet (15")
10	SS 6	71	7-11-11-10 (22)	SM		(SM) Brown, medium dense, fine SAND, some Silt, little fine Gravel, trace Cobbles, wet (17")(TILL)
15	SS 7	79	9-44-60-60 (104)	SM		(SM) Brown, very dense, fine SAND, some Silt, little fine Gravel, trace Cobbles, wet (19")(TILL)

Refusal at 19.0 feet.
Bottom of borehole at 17.0 feet.



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BORING NUMBER B-2

PAGE 1 OF 2

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

DATE STARTED 3/24/23

COMPLETED 3/24/23

GROUND ELEVATION _____ HOLE SIZE 4 inches

DRILLING CONTRACTOR Craig Drilling Co.

GROUND WATER LEVELS:

DRILLING METHOD Mud Rotary Drill Bit

▽ AT TIME OF DRILLING 7.00 ft

LOGGED BY MG

CHECKED BY CLL

AT END OF DRILLING ---

NOTES Concrete approx. 3.5"

AFTER DRILLING ---

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DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
						0.3 Concrete (3.5")
	SS 1	63	11-8-11-7 (19)	SP		(SP) Gray/dark brown, medium dense, medium to fine SAND, little fine Gravel, trace Silt, fragments of Concrete, dry (15")(FILL)
	SS 2	33	12-17-15-8 (32)	SP		2.0 (SP) Dark brown, dense, medium to fine SAND, little fine Gravel, trace Silt, trace Cobbles, dry (8")(FILL)
						4.0 (SC) Gray, medium dense, medium to fine SAND, some Silt, little fine Gravel. little Clay, v.moist (2")
5	SS 3	8	9-7-7-7 (14)	SC		6.0 (SC) 11"-Gray, medium dense, medium to fine SAND, some Silt, little fine Gravel, little Clay, wet
	SS 4	63	20-12-10-7 (22)	SC		7.3 ▽ (ML) 4"-Gray, medium dense, SILT, little fine Sand, little Clay, little fine Gravel, trace Cobbles, wet (15")
				ML		8.0 (ML) 13"-Gray, medium dense, SILT, little fine Sand, little Clay, little fine Gravel, trace Cobbles, wet
	SS 5	100	4-4-6-8 (10)	ML		9.1 (SM) 11"-Light brown, medium dense, medium to fine SAND, little Silt, little fine Gravel, trace Clay, trace Cobbles, wet (24")
10				SM		10.0 (SM) Brown, medium dense, medium to fine SAND, little Silt, little fine Grave, trace Clay, trace Cobbles, wet (16")
	SS 6	67	8-9-8-10 (17)	SM		
						15.0 (SM) Gray, dense, medium to fine SAND, little Silt, little fine Gravel, trace Clay, trace Cobbles, wet (3")
15	SS 7	13	20-15-29-35 (44)	SM		
						20.0 (ML) Gray, very dense, SILT, little fine Sand, little fine Gravel, trace Cobbles, wet (17")(TILL)
20	SS 8	71	28-23-28-28 (51)	ML		
						25.0 (ML) Gray, very dense, SILT, little fine Sand, little fine Gravel, trace Cobbles, wet (10")(TILL)
25	SS 9	42	48-62-64-60 (126)	ML		
						30.0
30						

(Continued Next Page)



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BORING NUMBER B-2

PAGE 2 OF 2

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/13/23 11:40 - P:\PROJ2102108838_TECHNICALREPORTS\GEOTECHNICAL REPORT\GINT\CLARKSTOWN HIGHWAY DEPARTMENT BORING LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
30	SS 10	100	100/5"	ML		(ML) Brownish gray, very dense, SILT, little fine Sand, little fine Gravel, trace Clay, trace Cobbles, wet (5")(TILL)
35	SS 11	100	100/3"	ML		(ML) Grayish brown, very dense, SILT, little fine Sand, little fine Gravel, trace Clay, trace Cobbles, wet (11")(TILL)

Refusal at 35.5 feet.
Bottom of borehole at 35.5 feet.



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BORING NUMBER B-3 (OW)

PAGE 1 OF 2

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

DATE STARTED 3/23/23

COMPLETED 3/23/23

GROUND ELEVATION HOLE SIZE 4 inches

DRILLING CONTRACTOR Craig Drilling Co.

GROUND WATER LEVELS:

DRILLING METHOD Mud Rotary Drill Bit

▽ AT TIME OF DRILLING 10.00 ft

LOGGED BY MG

CHECKED BY CLL

AT END OF DRILLING ---

NOTES Topsoil approx. 2.5"

▽ AFTER DRILLING 3.25 ft

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DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
	SS 1	54	3-4-3-3 (7)	SP		0.3 Topsoil (4") (SP) Brown, loose, medium to fine SAND, little fine Gravel, trace Silt, trace Cobbles, dry (13")(FILL)
	SS 2	38	3-3-3-3 (6)	SP		2.0 (SP) Brown, loose, medium to fine SAND, little fine Gravel, trace Silt, trace Cobbles, dry (9")(FILL)
5	SS 3	79	3-8-10-8 (18)	SM		4.0 (SM) Brown, medium dense, medium to fine SAND, little Silt, trace coarse to fine Gravel, trace Clay, moist (19")
	SS 4	63	10-8-10-5 (18)	SM		6.0 (SM) Brown, medium dense, medium to fine SAND, little Silt, trace coarse to fine Gravel, trace Clay, trace Cobbles, moist (15")
	SS 5	100	3-7-4-7 (11)	SM		8.0 (SM) Brown, medium dense, medium to fine SAND, little Silt, trace coarse to fine Gravel, trace Clay, wet (24")
10	SS 6	100	32-9-12-15 (21)	SM		10.0 (SM) Brown/black, medium dense, medium to fine SAND, little Silt, trace coarse to fine Gravel, trace Clay, wet (24")
15	SS 7	83	49-62-50-56 (112)	SM		15.0 (SM) Gray, very dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (20")
20	SS 8	63	39-39-74-81 (113)	SM		20.0 (SM) Gray, very dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (15")
25	SS 9	100	41-43-100/4"	SM		25.0 (SM) Brownish gray, very dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (16")
30						30.0

(Continued Next Page)



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BORING NUMBER B-3 (OW)

PAGE 2 OF 2

CLIENT Town of Clarkstown - Highway Department **PROJECT NAME** Clarkstown Highway Facility Expansion
PROJECT NUMBER 210883 **PROJECT LOCATION** Nanuet, NJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
30	SS 10	367	100/3"	SM	30.5	(SM) Gray, very dense, medium to fine SAND, little fine Gravel, some Silt, trace Clay, trace Cobbles, wet (11")(TILL)

Refusal at 30.5 feet.
Bottom of borehole at 30.5 feet.

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BORING NUMBER B-4

PAGE 1 OF 3

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

DATE STARTED 3/22/23

COMPLETED 3/23/23

GROUND ELEVATION HOLE SIZE 4 inches

DRILLING CONTRACTOR Craig Drilling Co.

GROUND WATER LEVELS:

DRILLING METHOD Mud Rotary Drill Bit

▽ AT TIME OF DRILLING 5.00 ft

LOGGED BY MG

CHECKED BY CLL

AT END OF DRILLING ---

NOTES Concrete approx. 4"

AFTER DRILLING ---

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/13/23 11:40 - P:\PROJ2102108838 TECHNICALREPORTS\GEOTECHNICAL REPORT\GINT\CLARKSTOWN HIGHWAY DEPARTMENT BORING LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
	SS 1	63	17-18-12-12 (30)	SP		Concrete (4") (SP) Brown, dense, mdium to fine SAND, little fine Gravel, trace Silt, fragments of Concrete, dry (15")(FILL)
	SS 2	50	14-50/2"	SP		(SP) Brown, very dense, medium to fine SAND, little fine Gravel, trace Silt, fragments of Concrete, dry (4")(FILL)
5	SS 3	29	6-9-8-11 (17)	ML		(ML) Brown, medium dense, SILT, little fine Sand, little Clay, trace fine Gravel, wet (7")
	SS 4	63	15-14-24-24 (38)	SM		(SM) Brown, dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (17")
	SS 5	71	18-27-24-23 (51)	SM		(SM) Brown, very dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (17")
10	SS 6	79	24-29-39-35 (68)	SM		(SM) Brown, very dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (19")
15	SS 7	96	20-53-61-64 (114)	SM		(SM) Brown, very dense, medium to fine SAND, some Silt, trace fine Gravel, trace Clay, trace Cobbles, wet (23")
20	RC 1	19		GP		(GP) (RC-1) BOULDER, gray, medium-grained, moderately weathered, medium strong, close discontinuity spacing. (Rec: 8%)(RQD: 12%)
25	RC 2	8		GP		(GP) (RC-2) BOULDER, gray, very coarse-grained, moderately weathered, medium strong, close discontinuity spacing. (Rec: 8%)(RQD: 0%)
30						

(Continued Next Page)



McLaren Engineering Group
530 Chestnut Ridge Road
Woodcliff Lake, NJ 07677
Phone: (201) 775-6000
Fax: (201) 746-8522

BORING NUMBER B-4

PAGE 2 OF 3

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/13/23 11:40 - P:\PROJ\2102108838 TECHNICAL REPORTS\GINT\CLARKSTOWN HIGHWAY DEPARTMENT BORING LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
30						
				GP		(GP) (RC-2) BOULDER, gray, very coarse-grained, moderately weathered, medium strong, close discontinuity spacing. (Rec: 8%)(RQD: 0%) (continued)
35	SS 8	100	75-100/5"	SM		35.0 (SM) Gray, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, wet (24")
40	SS 9	100	100/5"	SM		40.0 (SM) Gray, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, trace Cobbles, wet (10")(TILL)
45	SS 10	100	60-100/4"	SM		45.0 (SM) Gray, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, trace Cobbles, wet (15")(TILL)
50	SS 11	100	40-35-94-100/5"	SP		50.0 (SP) Gray, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, trace Cobbles, wet (24")(TILL)
55	SS 12	88	91-100/2"	SP		55.0 (SP) Brown/gray, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, trace Cobbles, wet (7")(TILL)
60	SS 13	100	100/3"	SP		60.0 (SP) Brown, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, trace Cobbles, wet (4")(TILL)

(Continued Next Page)



McLaren Engineering Group
530 Chestnut Ridge Road
Woodcliff Lake, NJ 07677
Phone: (201) 775-6000
Fax: (201) 746-8522

BORING NUMBER B-4

PAGE 3 OF 3

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
65	SS 14	100	100/5"	SP		65.0
				SP		(SP) Brown, very dense, medium to fine SAND, some Silt, little fine Gravel, trace Clay, trace Cobbles, wet (5")(TILL)
70						70.0
	RC 3	91				(RC-3) SANDSTONE, brown, fine-grained, completely weathered, very weak, very close discontinuity spacing, (Rec: 91%)(RQD: 22%)
75						75.0

Bottom of borehole at 75.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/13/23 11:40 - P:\PROJ2102108838_TECHNICALREPORTS\GEOTECHNICAL REPORT\GINT\CLARKSTOWN HIGHWAY DEPARTMENT BORING LOGS.GPJ



McLaren Engineering Group
530 Chestnut Ridge Road
Woodcliff Lake, NJ 07677
Phone: (201) 775-6000
Fax: (201) 746-8522

BORING NUMBER B-5

PAGE 1 OF 1

CLIENT Town of Clarkstown - Highway Department

PROJECT NAME Clarkstown Highway Facility Expansion

PROJECT NUMBER 210883

PROJECT LOCATION Nanuet, NJ

DATE STARTED 3/24/23

COMPLETED 3/24/23

GROUND ELEVATION HOLE SIZE 4 inches

DRILLING CONTRACTOR Craig Drilling Co.

GROUND WATER LEVELS:

DRILLING METHOD Mud Rotary Drill Bit

▽ AT TIME OF DRILLING 13.00 ft

LOGGED BY MG

CHECKED BY CLL

AT END OF DRILLING ---

NOTES Concrete approx. 4"

AFTER DRILLING ---

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/13/23 11:40 - P:\PROJ\2102108838 TECHNICAL\REPORTS\GINT\CLARKSTOWN HIGHWAY DEPARTMENT BORING LOGS.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
	SS 1	92	21-33-12-12 (45)	SP		Concrete (4") (SP) Light brown, dense, medium to fine SAND, little fine Gravel, trace Silt, fragments of Concrete, dry (22")(FILL)
	SS 2	83	13-9-12-13 (21)	SP		(SP) Brown, medium dense, medium to fine SAND, little fine Gravel, trace Silt, trace Cobbles, dry (20")(FILL)
5	SS 3	79	20-49-66-37 (115)	SP		(SP) Brown, very dense, medium to fine SAND, little fine Gravel, little Silt, trace Cobbles, dry (19")
	SS 4	100	57-65-47-41 (112)	SM		(SM) Brown, very dense, medium to fine SAND, little Silt, trace fine Gravel, trace Cobbles, dry (19")
	SS 5	164	60-100/5"	SM		(SM) Brown, very dense, medium to fine SAND, little Silt, trace fine Gravel, trace Cobbles, v.moist (18")
10	SS 6	100	25-25-49-100/4"	SM		(SM) Brown, very dense, medium to fine SAND, little Silt, trace fine Gravel, trace Cobbles, v.moist (22")
						▽
15	SS 7	145	35-100/5"	SM		(SM) Brown, very dense, medium to fine SAND, little Silt, trace fine Gravel, trace Cobbles, wet (16")
20	SS 8	127	49-80-100/3"	SM		(SM) Brown, very dense, medium to fine SAND, little Silt, little fine Gravel, trace Cobbles, wet (19")

Refusal at 22.5 feet.
Bottom of borehole at 21.5 feet.

Appendix D – Monitoring Well Logs



OBSERVATION WELL CONSTRUCTION SUMMARY

Well No. B-1(OW)

PROJECT Clarkston Highway Department		PROJECT NO. 210883							
LOCATION 2 Seeger Dr, Nanuet, NY 10954		ELEVATION AND DATUM N/A (NAVD88)							
DRILLING AGENCY Crag Drilling Co.		DATE STARTED 3/23/2023	DATE FINISHED 3/24/2023						
DRILLING EQUIPMENT Truck-mounted Rig		DRILLER Craig Drilling Co.							
SIZE AND TYPE OF BIT 3-7/8" Tricone Rollerbit		INSPECTOR Michael Garcia							
METHOD OF INSTALLATION A 2.00 INCH PVC SCREEN AND RISER WERE INSTALLED TO THE CORRECT DEPTH OF 19 FT; CASING WAS THEN REMOVED, AS THE CASING WAS REMOVED SAND FILTER WAS PACKED. A FLUSH-MOUNT WELL CAP WAS THEN INSTALLED.									
METHOD OF WELL DEVELOPMENT DEVELOPED ON 3/24/2023 2" DIA. PVC WITH 5' SLOTTED SECTION AT BOTTOM OF WELL.									
TYPE OF CASING STEEL		DIAMETER 4.00 inches							
TYPE OF SCREEN PVC		DIAMETER 2.00 inches							
BOREHOLE NOMINAL DIAMETER 4 inches		TYPE OF BACKFILL MATERIAL SPOILS							
TYPE OF SEAL MATERIAL N/A		TYPE OF FILTER MATERIAL NO. 1 FILTER SAND							
TOPSOIL	ELEVATION N/A	DEPTH (ft) 0	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p style="text-align: center;">WELL DETAILS</p> </div> <div style="flex: 1;"> <p style="text-align: center;">SUMMARY SOIL CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="height: 40px;">2 to 4 feet: FILL</td> <td style="text-align: center;">0.0</td> </tr> <tr> <td style="height: 40px;">4 to 8 feet: SILT (ML)</td> <td style="text-align: center;">6.0</td> </tr> <tr> <td style="height: 100px;">8 to 19 feet: SAND (SM)</td> <td style="text-align: center;">19.0</td> </tr> </table> </div> <div style="flex: 0.2; text-align: center;"> <p>DEPTH (FT)</p> </div> </div>	2 to 4 feet: FILL	0.0	4 to 8 feet: SILT (ML)	6.0	8 to 19 feet: SAND (SM)	19.0
2 to 4 feet: FILL	0.0								
4 to 8 feet: SILT (ML)	6.0								
8 to 19 feet: SAND (SM)	19.0								
TOP OF SCREEN	ELEVATION (ft) N/A	DEPTH (ft) 0							
TOP OF FILTER	ELEVATION (ft) N/A	DEPTH (ft) 0							
SCREEN LENGTH	ELEVATION (ft) N/A	DEPTH (ft) 19							
BOTTOM OF BORING	ELEVATION (ft) N/A	DEPTH (ft) 19							
GROUNDWATER ELEVATIONS									
ELEVATION (ft) N/A	DATE 3/23/2023	DEPTH TO WATER (ft) at 8:30 am 3.75							
ELEVATION (ft) N/A	DATE 3/23/2023	DEPTH TO WATER (ft) at 1:30 pm 3.78							
ELEVATION (ft) N/A	DATE 3/24/2023	DEPTH TO WATER (ft) at 10:47 am 3.90							
ELEVATION (ft) N/A	DATE 3/24/2023	DEPTH TO WATER (ft) at 12:00 pm 3.90							
131 W 35th St 4th floor, New York, NY 10001 https://www.mgmclaren.com/									



OBSERVATION WELL CONSTRUCTION SUMMARY

Well No. B-3(OW)

PROJECT Clarkston Highway Department			PROJECT NO. 210883												
LOCATION 2 Seeger Dr, Nanuet, NY 10954			ELEVATION AND DATUM N/A (NAVD88)												
DRILLING AGENCY Criag Drilling Co.			DATE STARTED 3/23/2023		DATE FINISHED 3/24/2023										
DRILLING EQUIPMENT Truck-mounted Rig			DRILLER Craig Drilling Co.												
SIZE AND TYPE OF BIT 3-7/8" Tricone Rollerbit			INSPECTOR Michael Garcia												
METHOD OF INSTALLATION A 2.00 INCH PVC SCREEN AND RISER WERE INSTALLED TO THE CORRECT DEPTH OF 19 FT; CASING WAS THEN REMOVED, AS THE CASING WAS REMOVED SAND FILTER WAS PACKED. A FLUSH-MOUNT WELL CAP WAS THEN INSTALLED.															
METHOD OF WELL DEVELOPMENT DEVELOPED ON 3/24/2023 2" DIA. PVC WITH 5' SLOTTED SECTION AT BOTTOM OF WELL.															
TYPE OF CASING STEEL		DIAMETER 4.00 inches	TYPE OF BACKFILL MATERIAL SPOILS												
TYPE OF SCREEN PVC		DIAMETER 2.00 inches	TYPE OF SEAL MATERIAL N/A												
BOREHOLE NOMINAL DIAMETER 4 inches			TYPE OF FILTER MATERIAL NO. 1 FILTER SAND												
TOPSOIL	ELEVATION N/A	DEPTH (ft) 0			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">SUMMARY SOIL CLASSIFICATION</th> <th style="width: 40%;">DEPTH (FT)</th> </tr> </thead> <tbody> <tr> <td></td> <td>0.0</td> </tr> <tr> <td>2 to 4 feet: FILL</td> <td>4.0</td> </tr> <tr> <td>4 to 8 feet: SILT (ML)</td> <td>6.0</td> </tr> <tr> <td>8 to 19 feet: SAND (SM)</td> <td>20.0</td> </tr> </tbody> </table>	SUMMARY SOIL CLASSIFICATION	DEPTH (FT)		0.0	2 to 4 feet: FILL	4.0	4 to 8 feet: SILT (ML)	6.0	8 to 19 feet: SAND (SM)	20.0
SUMMARY SOIL CLASSIFICATION	DEPTH (FT)														
	0.0														
2 to 4 feet: FILL	4.0														
4 to 8 feet: SILT (ML)	6.0														
8 to 19 feet: SAND (SM)	20.0														
TOP OF SCREEN	ELEVATION (ft) N/A	DEPTH (ft) 0													
TOP OF FILTER	ELEVATION (ft) N/A	DEPTH (ft) 0													
SCREEN LENGTH	ELEVATION (ft) N/A	DEPTH (ft) 20													
BOTTOM OF BORING	ELEVATION (ft) N/A	DEPTH (ft) 32													
GROUNDWATER ELEVATIONS															
ELEVATION (ft)	DATE	DEPTH TO WATER (ft)													
N/A	3/24/2024 at 10:00 am	3.3													
N/A	3/24/2024 at 1:00 pm	3.3													
131 W 35th St 4th floor, New York, NY 10001 https://www.mgmclaren.com/															

Appendix E –Laboratory Test Results



3348 Route 208, Campbell Hall, NY 10916

Phone: 845-496-1600 Fax: 845-496-1398

12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-3, S-3 (4-6')	Project #:	230418
Source:	B-3, S-3 (4-6')	Lab No.:	23-0523A
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/23	Tested By:	Robert Thomas

REPORT OF ATTERBERG LIMITS TEST RESULTS

TEST METHOD: ASTM D4318; LL Method A

Lab Number:	23-0523A	Specification
Liquid Limit:	N/A	
Plastic Limit:	N/A	
Plasticity Index:	Non-Plastic	

Notes: The soil characteristics of this sample do not allow for the liquid limit or plastic limit to be determined. Therefore, the plasticity index for the sample is 'non-plastic.'

Comments:

Report Reviewed By: _____

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Phone: 845-496-1600 Fax: 845-496-1398

12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-3, S-8 (20-22')	Project #:	230418
Source:	B-3, S-8 (20-22')	Lab No.:	23-0523B
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/23	Tested By:	Robert Thomas

REPORT OF ATTERBERG LIMITS TEST RESULTS

TEST METHOD: ASTM D4318; LL Method B

Lab Number:	23-0523B	Specification
Liquid Limit:	N/A	
Plastic Limit:	N/A	
Plasticity Index:	Non-Plastic	

Notes: The soil characteristics of this sample do not allow for the liquid limit or plastic limit to be determined. Therefore, the plasticity index for the sample is 'non-plastic.'

Comments:

Report Reviewed By: _____

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42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-4, S-5 (8-10')	Project #:	230418
Source:	B-4, S-5 (8-10')	Lab No.:	23-0523C
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/23	Tested By:	Robert Thomas

REPORT OF ATTERBERG LIMITS TEST RESULTS

TEST METHOD: ASTM D4318; LL Method B

Lab Number:	23-0523C	Specification
Liquid Limit:	N/A	
Plastic Limit:	N/A	
Plasticity Index:	Non-Plastic	

Notes: The soil characteristics of this sample do not allow for the liquid limit or plastic limit to be determined. Therefore, the plasticity index for the sample is 'non-plastic.'

Comments:

Report Reviewed By: _____

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12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-5, S-5 (8-10')	Project #:	230418
Source:	B-5, S-5 (8-10')	Lab No.:	23-0523D
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/23	Tested By:	Robert Thomas

REPORT OF ATTERBERG LIMITS TEST RESULTS

TEST METHOD: ASTM D4318; LL Method B

Lab Number:	23-0523D	Specification
Liquid Limit:	N/A	
Plastic Limit:	N/A	
Plasticity Index:	Non-Plastic	

Notes: The soil characteristics of this sample do not allow for the liquid limit or plastic limit to be determined. Therefore, the plasticity index for the sample is 'non-plastic.'

Comments:

Report Reviewed By: _____

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42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project	Clarkstown Highway Development (2
Material:	B-3, S-3 (4-6')	Project Number:	230418
Source:	B-3, S-3 (4-6')	Lab Number:	23-0523A
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/12/2023	Tested By:	Emily Rodriguez

Report for Unified Soil Classification

Test Method: ASTM D2487

USCS Group Symbol: **SM**

USCS Group Name: **Silty Sand with Gravel**

Specifications:

Comments:

Report Reviewed By: _____

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42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project	Clarkstown Highway Development (2
Material:	B-3, S-8 (20-22')	Project Number:	230418
Source:	B-3, S-8 (20-22')	Lab Number:	23-0523B
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	5/12/2023	Tested By:	Emily Rodriguez

Report for Unified Soil Classification

Test Method: ASTM D2487

USCS Group Symbol: **SM**

USCS Group Name: **Silty Sand with Gravel**

Specifications:

Comments:

Report Reviewed By: _____

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12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project	Clarkstown Highway Development (2
Material:	B-4, S-5 (8-10')	Project Number:	230418
Source:	B-4, S-5 (8-10')	Lab Number:	23-0523C
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/12/2023	Tested By:	Emily Rodriguez

Report for Unified Soil Classification

Test Method: ASTM D2487

USCS Group Symbol: **SM**

USCS Group Name: **Silty Sand with Gravel**

Specifications:

Comments:

Report Reviewed By: _____

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12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project	Clarkstown Highway Development (2
Material:	B-5, S-5 (8-10')	Project Number:	230418
Source:	B-5, S-5 (8-10')	Lab Number:	23-0523D
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/12/2023	Tested By:	Emily Rodriguez

Report for Unified Soil Classification

Test Method: ASTM D2487

USCS Group Symbol: **SM**

USCS Group Name: **Silty Sand with Gravel**

Specifications:

Comments:

Report Reviewed By: _____

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12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Item:	B-3, S-8 (20-22')	Project Number:	230418
Source:	B-3, S-8 (20-22')	Lab Number:	23-0523B
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/10/2023-04/11/2023	Tested By:	Robert Thomas

PARTICLE SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

Test Method: ASTM D422

Sieve Size	Particle Diameter, mm	Percent Passing	Specification
3/8"	9.50	83.0	
#4	4.75	81.3	
#10	2.00	75.5	
#40	0.425	62.3	
#200	0.075	38.4	
Hydrometer Analysis Results	0.050	31.7	
	0.020	16.0	
	0.010	13.5	
	0.005	9.0	
	0.002	5.5	

SOIL SPECIFIC GRAVITY: 2.67 (As reported separately, or estimated.)

DISPERSION METHOD: Mechanical, 1 min.

SAND & GRAVEL PARTICLES: Hard subrounded to subangular particles

Comments:

COMPOSITION SUMMARY (USDA SIZE DESIGNATIONS)		
Gravel	(3 inches to #10)	24.5%
Fraction Passing #10:		
Sand	(#10 to 0.05 mm)	58.0%
Silt	(0.05 mm to 0.002 mm)	34.7%
Clay	(Less than 0.002 mm)	7.3%
Total		100.0%
USDA Soil Textural Class		Sandy Loam

REPORT REVIEWED BY: _____

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42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Item:	B-5, S-5 (8-10')	Project Number:	230418
Source:	B-5, S-5 (8-10')	Lab Number:	23-0523D
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/10/2023-04/11/2023	Tested By:	Robert Thomas

PARTICLE SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

Test Method: ASTM D422

Sieve Size	Particle Diameter, mm	Percent Passing	Specification
3/8"	9.50	67.0	
#4	4.75	65.7	
#10	2.00	61.8	
#40	0.425	51.3	
#200	0.075	30.6	
Hydrometer Analysis Results	0.050	25.9	
	0.020	16.2	
	0.010	11.8	
	0.005	7.9	
	0.002	4.4	

SOIL SPECIFIC GRAVITY: 2.67 (As reported separately, or estimated.)

DISPERSION METHOD: Mechanical, 1 min.

SAND & GRAVEL PARTICLES: Hard and weak subrounded to subangular particles

Comments:

COMPOSITION SUMMARY (USDA SIZE DESIGNATIONS)		
Gravel	(3 inches to #10)	38.2%
Fraction Passing #10:		
Sand	(#10 to 0.05 mm)	58.1%
Silt	(0.05 mm to 0.002 mm)	34.8%
Clay	(Less than 0.002 mm)	7.1%
Total		100.0%
USDA Soil Textural Class		Sandy Loam

Emily J. Rodriguez

REPORT REVIEWED BY:___

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12960 Commerce Lake Drive, A14, Fort Myers, FL 33913

42 Day Farm Road, West Stockbridge, MA 01266

1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-3, S-3 (4-6')	Project Number:	230418
Source:	B-3, S-3 (4-6')	Lab Number:	23-0523A
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/2023	Tested By:	Robert Thomas

Report of Natural Moisture Content of Soil and Rock

Test Method: ASTM D2216

Wet Weight (g):	327.7
Dry Weight (g):	295.4
% Nat. Moisture:	10.9

Specification:

Comments:

No specifications available at time of testing.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-3, S-8 (20-22')	Project Number:	230418
Source:	B-3, S-8 (20-22')	Lab Number:	23-0523B
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/2023	Tested By:	Robert Thomas

Report of Natural Moisture Content of Soil and Rock

Test Method: ASTM D2216

Wet Weight (g):	300.6
Dry Weight (g):	278.5
% Nat. Moisture:	7.9

Specification:

Comments:

No specifications available at time of testing.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-4, S-5 (8-10')	Project Number:	230418
Source:	B-4, S-5 (8-10')	Lab Number:	23-0523C
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/2023	Tested By:	Robert Thomas

Report of Natural Moisture Content of Soil and Rock

Test Method: ASTM D2216

Wet Weight (g):	390.5
Dry Weight (g):	352.5
% Nat. Moisture:	10.8

Specification:

Comments:

No specifications available at time of testing.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Material:	B-5, S-5 (8-10')	Project Number:	230418
Source:	B-5, S-5 (8-10')	Lab Number:	23-0523D
Location:	In-Place	Item Number:	No Specification
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/7/2023	Tested By:	Robert Thomas

Report of Natural Moisture Content of Soil and Rock

Test Method: ASTM D2216

Wet Weight (g):	274.2
Dry Weight (g):	257.2
% Nat. Moisture:	6.6

Specification:

Comments:

No specifications available at time of testing.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Item:	B-3, S-3 (4-6')	Project Number:	230418
Source:	B-3, S-3 (4-6')	Lab Number:	23-0523A
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/10/2023	Tested By:	

GRADATION (SIEVE ANALYSIS) OF SOIL OR AGGREGATE

Test Method(s): ASTM D422, C136, C117; AASHTO T88, T27, T11

Lab Number	Sample Type	Sampling Location	Specification
23-0523A	B-3, S-3 (4-6')	In-Place	No Specification

Sieve Size		% Retained	% Passing	Spec. % Pass
mm	Inches			
100.0 mm	4"	0.0	100	
75.0 mm	3"	0.0	100	
63.0 mm	2 1/2"	0.0	100	
50.0 mm	2"	0.0	100	
37.5 mm	1 1/2"	0.0	100	
25.0 mm	1"	0.0	100	
19.0 mm	3/4"	7.2	93	
12.5 mm	1/2"	10.0	83	
6.3 mm	1/4"	6.5	76	
4.75 mm	#4	2.4	74	
2.00 mm	#10	5.1	69	
0.850 mm	#20	6.5	62	
0.600 mm	#30	4.4	58	
0.425 mm	#40	7.4	51	
0.150 mm	#100	22.0	29	
0.075 mm	#200	8.6	20	
Pan		19.9		

Comments:

Minus #200 by wash-sieve method.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Item:	B-3, S-8 (20-22')	Project Number:	230418
Source:	B-3, S-8 (20-22')	Lab Number:	23-0523B
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/11/2023	Tested By:	Robert Thomas

GRADATION (SIEVE ANALYSIS) OF SOIL OR AGGREGATE

Test Method(s): ASTM D422, C136, C117; AASHTO T88, T27, T11

Lab Number	Sample Type	Sampling Location	Specification
23-0523B	B-3, S-8 (20-22')	In-Place	No Specification

Sieve Size		% Retained	% Passing	Spec. % Pass
mm	Inches			
100.0 mm	4"	0.0	100	
75.0 mm	3"	0.0	100	
63.0 mm	2 1/2"	0.0	100	
50.0 mm	2"	0.0	100	
37.5 mm	1 1/2"	0.0	100	
25.0 mm	1"	0.0	100	
19.0 mm	3/4"	0.0	100	
12.5 mm	1/2"	3.9	96	
6.3 mm	1/4"	13.1	83	
4.75 mm	#4	1.7	81	
2.00 mm	#10	5.8	76	
0.850 mm	#20	6.2	69	
0.600 mm	#30	2.6	67	
0.425 mm	#40	4.4	62	
0.150 mm	#100	15.2	47	
0.075 mm	#200	8.7	38	
Pan		38.4		

Comments:

Minus #200 by wash-sieve method.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Item:	B-4, S-5 (8-10')	Project Number:	230418
Source:	B-4, S-5 (8-10')	Lab Number:	23-0523C
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/10/2023	Tested By:	Robert Thomas

GRADATION (SIEVE ANALYSIS) OF SOIL OR AGGREGATE

Test Method(s): ASTM D422, C136, C117; AASHTO T88, T27, T11

Lab Number	Sample Type	Sampling Location	Specification
23-0523C	B-4, S-5 (8-10')	In-Place	No Specification

Sieve Size		% Retained	% Passing	Spec. % Pass
mm	Inches			
100.0 mm	4"	0.0	100	
75.0 mm	3"	0.0	100	
63.0 mm	2 1/2"	0.0	100	
50.0 mm	2"	0.0	100	
37.5 mm	1 1/2"	0.0	100	
25.0 mm	1"	0.0	100	
19.0 mm	3/4"	0.0	100	
12.5 mm	1/2"	2.1	98	
6.3 mm	1/4"	11.3	87	
4.75 mm	#4	2.7	84	
2.00 mm	#10	6.7	77	
0.850 mm	#20	7.2	70	
0.600 mm	#30	2.9	67	
0.425 mm	#40	4.2	63	
0.150 mm	#100	13.9	49	
0.075 mm	#200	8.4	41	
Pan		40.6		

Comments:

Minus #200 by wash-sieve method.

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1813 State Route 7, Harpursville, NY 13787

Client:	McLaren Engineering Group	Project:	Clarkstown Highway Development (210883)
Item:	B-5, S-5 (8-10')	Project Number:	230418
Source:	B-5, S-5 (8-10')	Lab Number:	23-0523D
Date Sampled:	4/4/2023	Sampled By:	Client
Date Tested:	4/11/2023	Tested By:	Robert Thomas

GRADATION (SIEVE ANALYSIS) OF SOIL OR AGGREGATE

Test Method(s): ASTM D422, C136, C117; AASHTO T88, T27, T11

Lab Number	Sample Type	Sampling Location	Specification
23-0523D	B-5, S-5 (8-10')	In-Place	No Specification

Sieve Size		% Retained	% Passing	Spec. % Pass
mm	Inches			
100.0 mm	4"	0.0	100	
75.0 mm	3"	0.0	100	
63.0 mm	2 1/2"	0.0	100	
50.0 mm	2"	0.0	100	
37.5 mm	1 1/2"	0.0	100	
25.0 mm	1"	0.0	100	
19.0 mm	3/4"	15.3	85	
12.5 mm	1/2"	5.8	79	
6.3 mm	1/4"	11.9	67	
4.75 mm	#4	1.3	66	
2.00 mm	#10	3.9	62	
0.850 mm	#20	4.8	57	
0.600 mm	#30	2.2	55	
0.425 mm	#40	3.5	51	
0.150 mm	#100	13.1	38	
0.075 mm	#200	7.6	31	
Pan		30.6		

Comments:

Minus #200 by wash-sieve method.

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Minehardt, Todd A.

From: Michael Gianatasio <m.gianatasio@clarkstown.org>
Sent: Monday, May 22, 2023 9:43 AM
To: Minehardt, Todd A.; Kosier, Michael
Cc: Robert Milone
Subject: Fwd: [External Sender] Additional Survey & Geotech Requests for Information (McL 210883)

Todd,

Please see replies below from McLaren.



Michael Gianatasio, P.E.

Director
Department of Engineering & Facilities Management
P: 845-639-2111
F: 845-634-3743
m.gianatasio@clarkstown.org

----- Forwarded message -----

From: Paul Zheng <pzheng@mgmclaren.com>
Date: Mon, May 22, 2023 at 9:31 AM
Subject: RE: [External Sender] Additional Survey & Geotech Requests for Information (McL 210883)
To: Michael Gianatasio <m.gianatasio@clarkstown.org>
Cc: Robert Milone <r.milone@clarkstown.org>

Good Morning Michael,

See below for the seismic design parameters from our Geotechnical group. Below are responses from our Survey group in **blue** in response to your inquiries.

Seismic Design Parameters

Please see seismic design parameters for Town of Clarkstown – Highway Department Expansion.
The Seismic design parameters provided are in accordance with Site Class D and are valid for Risk Category I/II

Mapped Spectral Response Acceleration for Short Periods [Figure 1613.3.1(1)]	$S_s = 0.298g$
Mapped Spectral Response Acceleration for 1-Second Period [Figure 1613.3.1(2)]	$S_1 = 0.062g$
Site Coefficient [Table 1613.3.3(1)]	$F_a = 1.562$
Site Coefficient [Table 1613.3.3(2)]	$F_v = 2.4$
Max. Considered Earthquake Spectral Response for Short Periods [Eq. 16-37]	$S_{MS} = 0.465g$
Max. Considered Earthquake Spectral Response for 1-Second Periods [Eq. 16-38]	$S_{M1} = 0.148g$
Design Spectral Response Acceleration for Short Periods [Eq. 16-39]	$S_{DS} = 0.31g$
Design Spectral Response Acceleration for 1-Second Period [Eq. 16-40]	$S_{D1} = 0.099g$
Seismic Design Category	B

Thanks,

Paul Zheng, P.E. (he/him)

Associate, McLaren Engineering Group

201.775.6000 x3361 | 201.746.1163 (d) | www.mgmclaren.com | [in](#)



From: Michael Gianatasio <m.gianatasio@clarkstown.org>

Sent: Wednesday, May 17, 2023 3:45 PM

To: Paul Zheng <pzheng@MGMclaren.com>

Cc: Robert Milone <r.milone@clarkstown.org>

Subject: [External Sender] Additional Survey & Geotech Requests for Information

Please be cautious, this e-mail was sent from outside our organization.

Paul,

Good afternoon.

Please provide the following on the updated survey:

1. At SW corner of the map shows two gas valves that are not connected to the gas main. – One value is water, other gas. Lines drawn based on found paint marks. No marks lead to 2nd value. Requires sub-surface investigation.
2. At SW corner of the map shows three water valves not connected to a water main. – Requires sub-surface investigation.
3. SW of the existing roofed parking – the CB shows a drain headed NE towards the roofed parking – need to understand where it terminates as headed under proposed building extension. – Requires sub-surface investigation.
4. Need to understand where existing OWS to sanitary sewer connection is (maybe north of existing mapping). – Requires sub-surface investigation.
5. Need to understand where existing water service enters existing building (maybe north of existing mapping) – is there a meter vault or simple riser and meter at the existing garage? – No water meter observed in limits. Requires sub-surface investigation.
6. CB at NW corner – no invert – confirm line connects at SW CB. – As noted on plot, NW inlet under vehicle during site visits, direction/size/type/invert of pipe(s) could not be observed.
7. Sanitary at west side of existing garage/north end of the map – what is the flow direction of the two pipes – does this service the existing garage (see #4 above). – No line from building to structure observed. Known inverts suggest flow in from N, out to W. Need connecting structures to confirm.

Regarding the Geotechnical Report – Is there a recommendation for the seismic design coefficient?

Thank you.

Michael Gianatasio, P.E.

Director

Department of Engineering & Facilities Management

P: 845-639-2111

F: 845-634-3743

m.gianatasio@clarkstown.org

Town of Clarkstown.

Stormwater Pollution Prevention Plan

Highway Garage Expansion

Nanuet, New York

June 2024

Stormwater Pollution Prevention Plan

Clarkstown Highway Garage Expansion

June 2024

Prepared By:

Arcadis of New York, Inc.
855 Route 146, Suite 210
Clifton Park
New York 12065
Phone: 518 250 7300
Fax: 518 371 2757

Prepared For:

Michael Gianatasio, P.E.
Director
Town of Clarkstown – Dept. of Engineering and
Facilities Management
10 Maple Avenue
New City, NY 10956

Our Ref:

30171703

Todd Minehardt, P.E.
Principal Civil Engineer

Michael Kosier, P.E.
Associate Vice President

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Appendices

Appendix A Erosion and Sediment Control Drawings

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Acronyms and Abbreviations

Arcadis	Arcadis of New York, Inc.
SWPPP	Stormwater Pollution Prevention Plan
Site	12 Seegar Drive, Nanuet, NY 10594
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
SPDES	State Pollution Discharge Elimination System
BMPs	Best Management Practices
cy	Cubic Yards
NOI	Notice of Intent
OPRHP	Office of Parks, Recreation and Historic Preservation
SHPO	State Historic Preservation Office
DOW	Division of Water
CPESC	Certified Professional in Erosion and Sediment Control
MS4	Municipal Separate Storm Sewer System

1 Project Information

1.1 Introduction

On behalf of The Town of Clarkstown (Town) Highway Department, Arcadis of New York, Inc. (Arcadis) has prepared this Stormwater Pollution Prevention Plan (SWPPP) for the Clarkstown Highway Garage Expansion at The Town of Clarkstown Highway Department located at 12 Seeger Drive in the Hamlet of Nanuet, New York (Site). For detailed information regarding the design and planned construction activities, refer to the Clarkstown Garage Expansion Drawings (Appendix A).

This SWPPP has been prepared pursuant to the New York State (NYS) Department of Environmental Conservation (NYSDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001). The SWPPP objectives for the Site are to:

- Minimize the potential for erosion and conveyance of soil/sediment via surface runoff, to down-gradient on-site areas, that are outside the limits of work and off-site areas.
- Minimize the potential for erosion and conveyance of soil/sediment via surface run-off, such that, water quality (visible turbidity) in downgradient water bodies is not significantly affected relative to pre-construction conditions.
- Minimize the potential for erosion and sediment migration within the work areas.
- Minimize the potential for mechanical tracking of soils/sediments onto off-site areas.
- Identify potential pollutants and their sources; eliminate, control, or otherwise manage each potential pollutant or its source using appropriate Best Management Practices (BMPs).

1.2 Project Description

The Town of Clarkstown (Town) Highway Department currently maintains and operates an existing 42,007 square foot (SF) highway garage, with a separate pavilion-style open bay structure for covered equipment parking, an open (uncovered) parking area for additional equipment storage, and an adjacent parking lot for employee and visitor parking.

The Town intends to expand the existing highway garage to provide additional indoor equipment storage, as well as one lean-to type roof structures to maximize covered equipment storage. The enclosed portion of the expansion is expected to be approximately 17,800 SF, and an additional covered parking area located east of the existing and new garage addition approximately 6,800 SF.

Additionally, repairs will be made to the existing garage building interior which is expected not to cause additional land disturbance or pollutants production.

1.3 Existing Site Conditions

The project site consists of existing paved area that is utilized as a parking and equipment storage space and a small area of existing lawn. Site access will be via driveway entrance off Seeger Drive. Surrounding land use

consists of paved parking spaces to the west northwest and north and Seeger Drive to the east, southeast and south. For additional Site information, refer to the Technical Drawings provided in Appendix D.

Stormwater runoff generated within the project Site limits occurs primarily as sheet flow and the runoff travels to catch basins located in the south-southwest of the site.

1.4 Soils

The lands within the watershed consist predominately of soils with dual hydrologic soil group C/D. If a soil is assigned to a dual hydrologic group, the first letter is for adequately drained areas and the second is for undrained areas in their natural condition. For modeling purposes, soils containing a dual hydrologic soil group designation within the Site will be assumed as group D. Soil types were identified based on information available from the United States Department of Agriculture's Web Soil Survey (Appendix B).

1.5 Potential Pollution Sources

The following is a list of potential pollutants that could impact stormwater quality during construction activities if not properly managed:

- Sediment
- Vehicle and equipment fluids (e.g., fuel, grease, coolant, oil)
- Vegetative debris from clearing operations
- Landscaping materials (e.g., mulch, fertilizer)
- General litter or other project-related waste

Appropriate BMPs will be used to reduce or eliminate the potential release of these pollutants, including sources of sediment in stormwater as described in the following sections.

1.6 Project Permitting and Compliance

1.6.1 State Pollution Discharge Elimination System General Permit

This SWPPP has been prepared in accordance with the substantive requirements of the SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-20-001 (Appendix E). Activities included in this SWPPP require coverage under GP-0-20-001 as this project will disturb more than one acre. A Notice of Intent (NOI) will be submitted to the NYSDEC for this project (Appendix D). The NOI will include the SWPPP Preparer and project Owner/Operator certification forms.

1.6.2 Municipal Separate Stormwater Sewer System Permit

According to the NYSDEC stormwater interactive map, the Site is located within a regulated MS4. Therefore, an MS4 SWPPP acceptance form will be submitted to the NYSDEC with the NOI.

1.6.3 Office of Parks, Recreation and Historic Preservation Review

In accordance with GP-0-20-001, any construction activities that have the potential to affect historic and/or archaeological resources are not eligible for coverage under the general permit unless the screening and consultation process specified in the Letter of Resolution that was developed between the NYSDEC and the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) has been completed and the required documentation demonstrating that potential impacts have been avoided or mitigated is obtained and maintained on-site. The review of New York State Historic Preservation Office (SHPO) publicly available data showed the Site does not lie within an archaeologically sensitive area. The review also showed that there were no registered historic resources within the vicinity of the Site.

2 Construction Sequence

Refer to Drawing G-02 of the Erosion and Sediment Control Drawings (Appendix A) for a description of the anticipated construction activities. Specific construction activity sequencing may vary depending on field conditions encountered at the time of construction, and any implemented changes to the construction sequence will be completed in compliance with applicable regulatory requirements and the overall objectives described in Section 1.1.

3 Erosion and Sediment Control Plan

The site contractor will be responsible for installing and maintaining all temporary erosion and sediment control measures required during project construction activities. All erosion and sediment controls will be installed and maintained in accordance with the latest edition of the NYS Standards and Specifications for Erosion and Sediment Control (NYS Standards and Specifications). Erosion and sediment control BMPs specific to this project are provided on the Erosion and Sediment Control Drawings (Appendix A). Temporary erosion and sediment control measures will be installed prior to initiation of soil disturbing activities. The Contractor will also be responsible for providing additional erosion and sediment control measures, as needed, or as directed, to achieve the stormwater management objectives of this SWPPP and maintain compliance with this SWPPP.

3.1 Erosion and Sediment Control Measures

Erosion and Sediment Control Drawings (sheets 6-8, and 14, Appendix A) provide information regarding the types, locations, and specifications of erosion control measures for the project.

Additional erosion and sediment control measures considered for implementation at the Site that are not specifically identified in the Erosion and Sediment Control Drawings are included below.

3.1.1 Site Planning and Prevention Measures

The following site planning and prevention measures will be implemented for effective temporary (during construction) and final (post construction) erosion control:

- Temporary soil stockpiles (e.g., stone, topsoil), if needed, will be located in areas of the Site where the stockpiles can be protected from significant runoff that could result in washout and erosion of the

stockpiled material. Sediment controls established around the full perimeter of the stockpiles may be required at downgradient locations to prevent migration of saturated soils.

- The contractor and developer's on-site representative and/or the Engineer will work together to properly plan and sequence construction events to effectively minimize the duration that erodible soil and stockpiled materials are exposed.
- For areas consisting of less than 5 acres of disturbed soil: In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, NYS Standards and Specifications.
- For areas consisting of greater than 5 acres of disturbed soil: In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, NYS Standards and Specifications.

3.1.2 Construction Road and Parking Area Stabilization

The Site will be accessed off Seeger Drive. Parking will not be permitted on bare soil or vegetated areas unless agreed to by the Developer's on-site Representative and/or the Engineer. Parking areas will be designated and communicated to all personnel.

3.1.3 Dust Controls

Dust controls may include applying water to exposed soils from a water truck, an on-site water tank, or other approved water source, limiting vehicle speeds, sweeping paved roadways, and mulching bare soil areas. These activities will be implemented as needed based on observed conditions, or as directed by the Developer's on-site Representative and/or the Engineer during construction, to reduce the potential for dust generation. Water for dust suppression will be applied such that runoff or excessive soil saturation does not result in soil erosion or sediment transport.

If necessary, other methods and means for controlling dust (e.g., soil binders) may be considered. Such measures will be reviewed for acceptability by the Developer's on-site Representative and/or the Engineer prior to use by the Contractor.

3.1.4 Good Housekeeping Practices

Good housekeeping measures will be implemented to reduce the potential for construction materials to enter stormwater drainage from the Site. During construction, the Contractor will be responsible for maintaining the Site in a neat and orderly fashion. This will include, but not necessarily be limited to, the following:

- Routine waste management activities, including the collection and disposal of trash, construction waste, and sanitary wastes.
- Immediate cleanup of spills of liquid or dry materials (if any).

- Prompt cleanup (i.e., as soon as possible, but by the end of workday) of notable accumulations of sediments (if any) inadvertently tracked by construction vehicles and/or transported by wind or stormwater from active work areas to non-work areas of the Site or off-site areas.

3.1.5 Vehicle Maintenance and Material Storage Area

The Contractor will perform routine vehicle/equipment maintenance activities and will store and manage construction materials (such as fuels, fertilizers, BMP materials) in designated areas to prevent their potential release to stormwater drainage. Any fuels or fluids must be properly covered, contained, and/or placed in a temporary shed or enclosure.

3.1.6 Topsoil Placement

For topsoil and seeding specifications refer to Erosion and Sediment Control Drawings in Appendix A. Soil shall be de-compacted where necessary prior to placement of topsoil. Decompaction shall be performed in accordance with Table 5.2 of the NYS Stormwater Design Manual.

3.1.7 Surface Roughening

Surface roughening will aid in the establishment of vegetative cover from seed, reduce runoff velocity and increase infiltration, and trap sediment. Surface roughening includes creating horizontal grooves across a slope (i.e., perpendicular to the downslope direction) using a spike-tooth harrow, tilling equipment, disking attachments, or tracking the area with appropriate construction equipment. The type of surface roughening techniques will be determined in the field by the Contractor and the Developer's on-site Representative and/or the Engineer.

3.2 Inspection and Maintenance of Erosion and Sedimentation Controls

3.2.1 Inspection and Contractor Notification Requirements

Inspections of erosion and sediment controls will be performed to confirm that the requirements of this SWPPP are being implemented properly and remain functional relative to site conditions and actual project activities. Prior to land disturbing activities (excluding installation of erosion and sediment control practices), a Qualified Inspector (see Section 3.2.5) will perform a pre-construction site assessment to verify that erosion and sediment controls are properly installed and functional.

During construction activities, all erosion and sediment control practices and pollution prevention measures implemented within the active work area will be inspected daily by a Trained Contractor (as specified in Section 3.2.5) to ensure that they are being maintained in effective operating conditions at all times. If deficiencies are identified, the Contractor (or subcontractors) will begin implementing corrective actions within one (1) business day and shall complete the corrective actions in a reasonable time frame.

Throughout the active construction period, a Qualified Inspector (see Section 3.2.5) will conduct inspections of all Site areas affected by construction at least once every 7 calendar days. If more than five (5) acres of soil is disturbed, inspection frequencies will increase to at least twice every 7 calendar days. These two (2) inspections

will be separated by a minimum of two (2) full calendar days. At a minimum, the Qualified Inspector will inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management (PCSM) practices (if applicable) under construction to ensure that they are constructed in conformance with this SWPPP until such time as the Site is deemed sufficiently stable and no longer requiring inspection. Inspections include all disturbed areas that have not achieved final stabilization, all points of discharge to natural surface waterbodies within or immediately adjacent to the Site, and all points of stormwater discharge from the Site. After each inspection, the Qualified Inspector will prepare an inspection report in accordance with Section 3.3. Within one (1) business day of the completion of an inspection, the Qualified Inspector will notify the Developer's on-site Representative and/or the Engineer and appropriate Contractor (or subcontractors) of any necessary corrective actions. The Contractor (or subcontractor) will begin implementing the corrective actions within one (1) business day of the inspection notification and will complete the corrective action in a reasonable time frame unless a modified timetable is approved by the Developer's on-site Representative and/or the Engineer.

3.2.2 Inspections During Shutdown

In the event that project activities are temporarily suspended (e.g., winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the Qualified Inspector will conduct a Site inspection at least once every 30 calendar days. The Developer's Representative will notify the Division of Water (DOW) Water (SPDES) Program contact at the Regional Office (21 South Putt Corners Rd., New Paltz, NY 12561), in writing prior to reducing the inspection frequency. Additionally, the Qualified Inspector can discontinue these inspections if all disturbed areas of the Site (as of the project shutdown date) have achieved final stabilization and all PCSM practices (if applicable) have been constructed in conformance with this SWPPP and are operational.

3.2.3 Maintenance Requirements

Maintenance or repair of installed erosion and sediment controls will be initiated within 1 business day following notification of deficiencies unless a modified timetable is approved by the Developer's on-site Representative and/or the Engineer and completed in a reasonable timeframe (i.e., prior to the next scheduled inspection). Erosion and sediment control measures will be maintained for the duration of the project until such time as all permanent stabilization measures have become fully established and a satisfactory final Site inspection (described in Section 3.4) has been performed by a Qualified Inspector.

3.2.4 Contractor Compliance Certification

The Contractor and subcontractors are required to certify that their respective activities will comply with the relevant portions of this SWPPP. All such certifications will be in writing and retained at the Site with the SWPPP document. The Contractor certification statement and signature page are included with this SWPPP (Appendix B). In accordance with Part III.A.6 of GP-0-20-001, all Contractors and subcontractors must provide contact information and describe the elements of this SWPPP they are responsible for.

3.2.5 Training Requirements

The Contractor and subcontractors involved in soil-disturbing activities will identify at least one person from their company that will be responsible for inspection of the SWPPP components defined herein. This individual will

have completed the requirements to be considered a “Trained Contractor” in accordance with GP-0-20-001, meaning they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. At least one Trained Contractor must be on-site daily when soil-disturbing activities are being performed. Note that the Trained Contractor cannot perform the duties of the Qualified Inspector unless the Trained Contractor also meets the Qualified Inspector qualifications.

The Qualified Inspector will meet the requirements of GP-0-20-001, meaning they will be a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, NYSDEC-endorsed individual, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity.

3.3 Recordkeeping

The following reporting and recordkeeping requirements will be followed for the project:

- SWPPP (and related documents) – a copy of this SWPPP, NOI, NOI Acknowledgement Letter, inspection reports, contractor compliance certification, and any other relevant documents will be retained on-site for the duration of project construction activities. These documents will be retained in a secured location readily available to individuals performing compliance inspections.
- Weekly Inspections Reports – the construction area will be inspected at a minimum of once every 7 calendar days or twice every 7 calendar days if more than five acres of soil remain disturbed (see Section 3.2.1). Inspection reports will be prepared by a Qualified Inspector after every inspection. At a minimum, the inspection report shall include and/or address the following:

Date and time of inspection.

- Name and title of person(s) performing the inspection.
- A description of the weather and soil conditions (e.g., dry, wet, saturated) at the time of inspection.
- A description of the condition of the runoff at all points of discharge from the construction Site, including any discharges of sediment and discharges from conveyance systems (i.e., pipes, culverts, and ditches) and overland flow.
- A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface waterbody.
- Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance.
- Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced.
- Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection.

- Current phase of construction of all PCSM practices (if applicable), and identification of construction that is not in conformance with this SWPPP and technical standards.
 - Corrective action(s) that must be taken to install, repair, replace, or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the installation of the PCSM practice(s) (if applicable).
 - Identification and status of all corrective actions that were required by previous inspection.
 - Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The Qualified Inspector shall attach paper color copies of the digital photographs to the inspection report being maintained on-site within seven (7) calendar days of the date of the inspection. The Qualified Inspector shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The Qualified Inspector shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.
 - All inspection reports will be signed by the Qualified Inspector and copies maintained on-site as described above.
- Records Retention – copies of this SWPPP, NOI, NOI Acknowledgement Letter, and any reports submitted or prepared in conjunction with this SWPPP will be retained by the facility owner/operator for a period of at least 5 years from the date that the NYSDEC receives the Notice of Termination.
 - SWPPP Updates – the SWPPP will accurately document all erosion and sediment control practices and pollution prevention measures being implemented at the Site. The SWPPP will be amended, at a minimum:
 - Whenever the current provisions are ineffective in minimizing pollutants in stormwater discharges from the Site.
 - Whenever there is a change in design, construction, or operation at the construction Site that has the potential to effect stormwater discharge.
 - To address issues of deficiencies identified during an inspection by the Qualified Inspector or other regulatory authorities.

3.4 Site Restoration

A final Site inspection will be performed and documented by the Qualified Inspector to verify that all disturbed areas are suitably stabilized (i.e., uniform perennial vegetative cover with at least 80 percent density, permanent landscape mulches, or impervious cover [e.g., asphalt, concrete]). Final stabilization will be implemented in accordance with NYS Standards and Specifications and the Erosion and Sediment Control Drawings (Appendix A). If disturbed areas are not sufficiently stabilized, measures will be implemented to correct the substandard areas and a second final Site inspection will be performed. Following successful completion of the final Site stabilization, the Contractor will remove any temporary erosion and sediment control features that are no longer needed, as appropriate.

4 Pollution Prevention Controls

4.1 General

In addition to the good housekeeping practices described under Section 3.1.4, the Contractor will implement measures to prevent spills from occurring and to properly respond to spills/spill-related emergencies. The Contractor will also adhere to all applicable regulations and the Developer's Site management procedures in the event of a spill.

At a minimum, the following pollution prevention procedures will be implemented by the Contractor during construction.

4.2 Spill Prevention Plan

Prior to mobilization, all mechanical equipment scheduled for delivery to the Site, will be visually inspected by the Contractor for, but not limited to, potential sources of spills or leakage of hydraulic fluid, engine oil, transmission fluid, fuel, and grease (e.g., by inspecting the condition of hydraulic cylinders, hoses, gaskets, fuel tanks). For potential sources that are identified, the Contractor will remove and replace the subject equipment and/or make available on-site the necessary materials to manage the source and impacted area in the event of a spill or leakage. At a minimum, the Site will be equipped with at least one spill kit consisting of sorbents, absorbent booms, and fire extinguishers. In the event of a spill or leakage, the Contractor will be responsible for safely mitigating the source condition and removal/disposal of any impacted materials.

The Contractor will take the following precautions to minimize the potential for spills of fuel or lubricants during the construction activities. At a minimum, these precautions will include:

- Placing secondary containment measures around all fuel and lubricant storage tanks/units.
- Performing refueling activities on level ground within vehicle/equipment maintenance and fueling area, which is away from steep slopes and runoff conveyance features (e.g., ditches, storm sewers).
- Not leaving equipment unattended during refueling.
- Smoking, snacking, eating, etc., only in areas designated for such activities that are located away from the refueling area.
- Not refilling fuel tanks while the engine is running.
- Replacing fuel caps immediately after filling and before starting the engine.
- Securing fuel pump dispensers when not in use to avoid accidental fuel release.
- Performing inspections and tests of equipment and portable fuel tanks to check for leaks and evaluate the condition of hydraulic hoses and connections. If leaks are observed, transfer the contents to an alternate tank/storage unit and replace the equipment/tank or repair the leak, as appropriate.
- Maintaining all equipment in accordance with the manufacturer's specifications.
- Operating all vehicles and equipment safely and park them a safe distance away from Site hazards and sensitive resources.

4.3 Spill Response Plan

The Contractor will be responsible for implementing appropriate spill response procedures when responding to releases of, but not limited to, oil, products, and materials during the performance of construction activities. All spills will be immediately reported by the Developer's Representative to federal, state, and local agencies as required, as well as the personnel listed below:

- Contractor's Project Manager
- Engineer

Names and phone numbers of these personnel will be included in a phone number list. Reporting requirements of spills to necessary agencies will be in accordance with applicable regulations. The Contractor will be responsible for implementing appropriate spill response procedures, which may include the following:

1. Ceasing operation of the affected equipment: This will consist of shutting off the equipment and/or closing any valves and stopping the leak, if possible.
2. Containing the spill: If the spilled material is floating on a water surface, spill-absorbent pads/booms will be placed across the path of the floating spill. If the spilled material sinks below the water surface, a dam, weir, or other containment method will be used to stop the flow of the spilled material. If the spill occurs on land, a ditch, dam, or other containment unit will be constructed to stop the flow of the spilled material. Absorbent material will be applied as necessary.
3. Cleaning up the spill: Spills in water will be recovered using, but not limited to, pumps and sorbent material, as necessary, until the spilled material is recovered (and no sheen or other evidence of the spill is observed on the water surface). Spills on land will be recovered using pumps, sorbent material, hand tools, and/or heavy equipment, as necessary, until the spilled material is recovered. Other activities to be performed during spill cleanup activities include removing impacted soil/sorbent pads and using rags and cleaning solution to remove excess spilled material from equipment.
4. Containerizing spill materials: Spilled materials, including, but not limited to, impacted soil and sorbent pads will be containerized in NYS Department of Transportation-approved containers. The containers will be labeled with the waste type and date of accumulation in accordance with applicable regulations. Samples will be collected to characterize the spilled materials for disposal, as required.
5. Disposing of spill materials: Impacted materials and spill cleanup debris will be disposed at a facility permitted to accept such materials.
6. Performing post-spill maintenance: Following cleanup of the spill, the Contractor's project manager will verify that all used spill cleanup material and equipment has been disposed or decontaminated, as appropriate. If the equipment that caused the spill cannot be properly repaired, replacement equipment will be obtained.

4.4 Emergency Coordination Plan

In the event of a spill and/or emergency, the Contractor's project manager will complete (at a minimum) the activities described below:

- Immediately notify appropriate Site personnel (i.e., Developer's on-site Representative).
- Inform Site personnel of any potential hazards and required levels of personal protective equipment to conduct the cleanup.
- Record the following information pertaining to the spill:

- Name of the person(s) who identified and reported the spill incident.
- Date, time, and location (include address of the spill incident)
- Brief description and cause of the spill incident
- Estimated quantity and type of material spilled.
- Extent and description of impacts to soil, sediment, and water from the spill
- Any damages or injuries related to the spill.
- Actions (completed or continuing) to stop, remove, and mitigate the effects of the discharge.

If there is an immediate threat to human health and/or the environment, the Contractor will promptly notify the appropriate authorities (i.e., local police, fire departments, hospitals, and state and local emergency response teams). As indicated above, the Developer's Representative will coordinate spill reporting to the appropriate agencies (e.g., NYSDEC).

4.5 Contact Personnel

The Contractor will prepare a list of contact names and phone numbers for the following personnel and/or organizations:

- Developer (primary contact)
- Developer's on-site Representative
- Engineer (Arcadis for Site Civil Components)
- Contractor on-site lead personnel (Site supervisor)
- Local hospital
- Local ambulance service
- Local fire department
- Local, county, and state police department

5 Post-Construction Stormwater Management

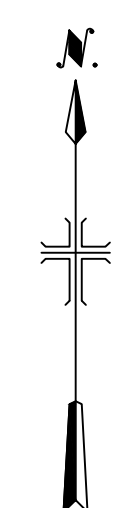
5.1 Water Quantity Control

A hydrologic analysis was performed to determine the effects of the Clarkson Highway Garage Expansion on the stormwater runoff peak flow rate from the Site. The existing surfaces within the proposed project site consist of lawn and paved surfaces. After construction, impervious areas within the site will increase, due to the proposed new parking resulting in an increase in the composite curve number from 92.8 to 96.9. The peak runoff is expected to increase in comparison to pre-construction. The total peak run off-of the contributing areas is expected to increase by approximately 28% from 2-year 24-hr rainfall event, compared to pre-construction.

The proposed project construction will not require the installation of water quality treatment measures. The stormwater runoff quality will not be affected as the proposed construction area will consist of impervious surfaces. Additionally, land disturbance is expected to be limited and stormwater will discharge to existing storm sewer systems.

Appendix A

Erosion and Sediment Control Drawings

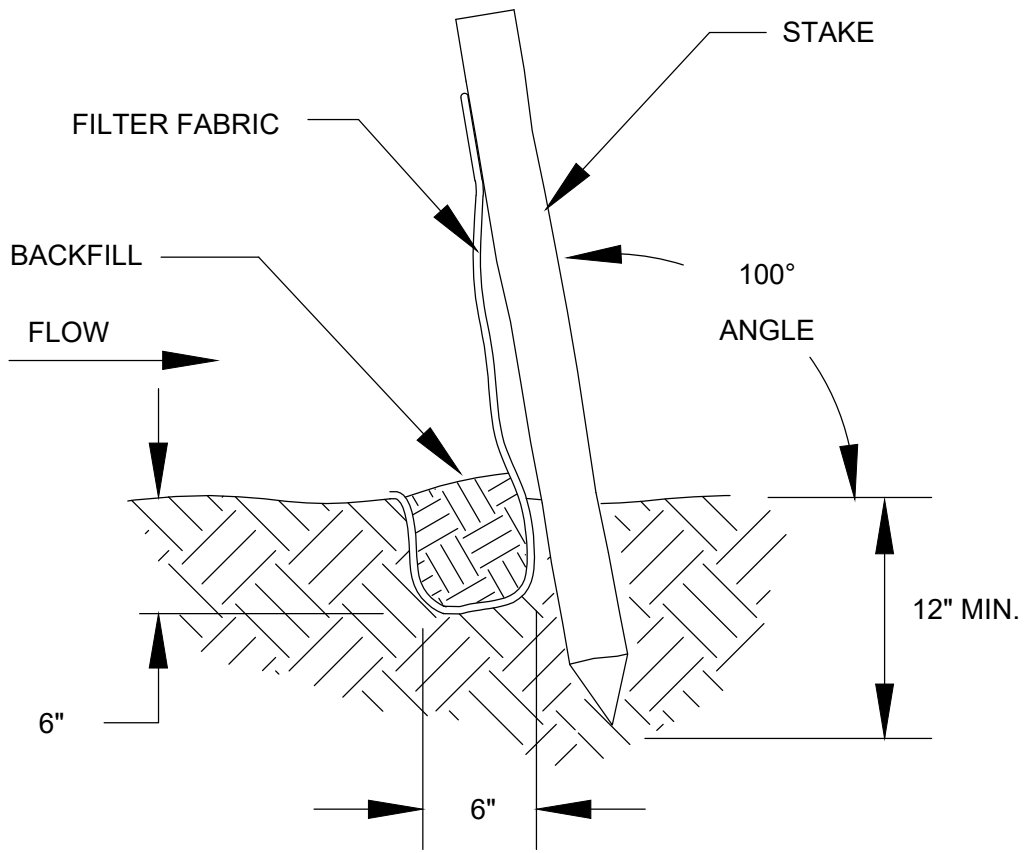


NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROLS DURING ALL SITE DISTURBANCES UNTIL THE SITE'S FINAL RESTORATION AND STABILIZATION ARE COMPLETE.

SCALE(S) AS INDICATED							Professional Engineer's Name			100% PROGRESS DESIGN - NOT FOR CONSTRUCTION	 ARCADIS OF NEW YORK, INC.	CLARKSTOWN HIGHWAY GARAGE EXPANSION • CLARKSTOWN, NY			ARCADIS Project No. 30171703	C-03
								Professional Engineer's No.				Date : JUNE 2024				
								State	Date Signed			Project Mgr.	EROSION AND SEDIMENT CONTROL PLAN	ARCADIS OF NEW YORK, INC. 201 FULLER ROAD SUITE 201 ALBANY, NY 12203		
								NY								
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:		USE TO VERIFY FIGURE REPRODUCTION SCALE	No.	Date	Revisions		By	Ckd	Designed by	Drawn by	Checked by					
			THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REPRODUCED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAID ENTITY.													

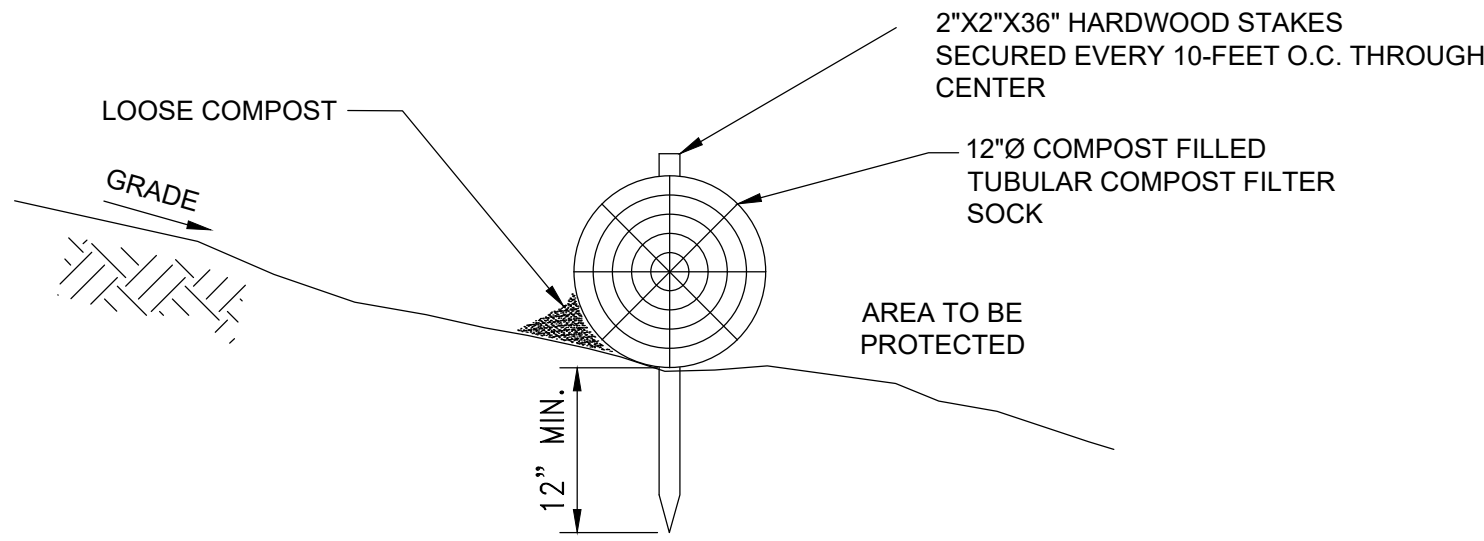
C:\Users\sharib623\ARCADIS\GEC India - ANA Water - 30171703_Clarkstown Highway Garage Expansion\Drawings\Sheets\Civil\C-04.dwg LAYOUT: C-04 SAVED: 5/28/2024 1:21 PM ACADVER: 24.3s (LWS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 5/28/2024 1:22 PM BY: DARSHAN, L



1 SILT FENCE INSTALLATION DETAIL
C-04 NOT TO SCALE

STANDARD PROCEDURES FOR THE INSTALLATION OF SILT FENCE:

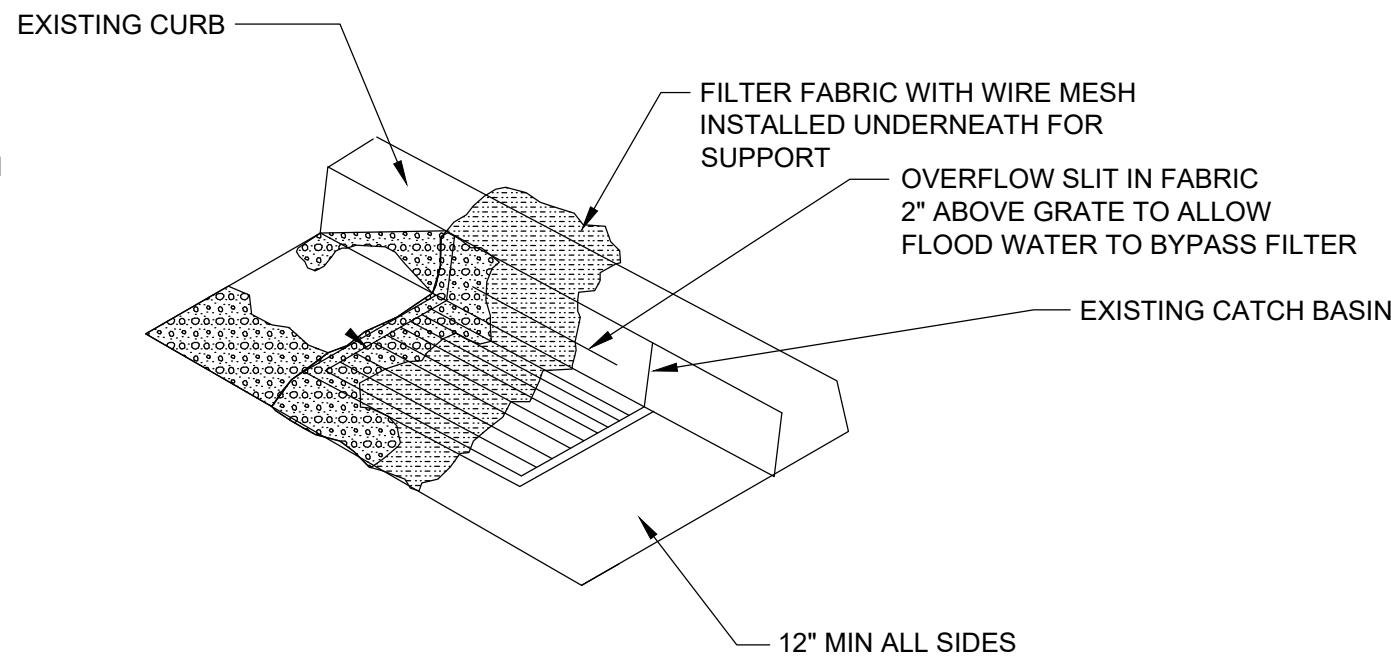
1. THE SILT FENCE SHALL BE PLACED AS NECESSARY AT LOCATIONS AS DIRECTED BY THE ENGINEER OR BY TOWN AGENCIES HAVING JURISDICTION TO CONTROL THE MOVEMENT OF SEDIMENT. ALL SILT FENCE SHALL BE PLACED WITHIN THE EASEMENT.
2. AT THE TIME OF INSTALLATION, THE SILT FENCE SHALL BE REJECTED IF IT HAS DEFECTS, RIPS, HOLES, FLAWS, DETERIORATION OR DAMAGE INCURRED DURING MANUFACTURE, TRANSPORTATION, OR STORAGE.
3. SILT FENCE SHALL BE INSTALLED FAR ENOUGH UP THE SLOPE SO THAT THE BOTTOM OF THE FENCE END IS HIGHER THAN THE TOP OF THE LOWEST PORTION OF THE FENCE.
4. MINIMUM LENGTH OF SILT FENCE IS 15 LF.
5. MAXIMUM POST SPACING IS 10 LF.
6. JOINTS ONLY AT SUPPORT POST WITH MINIMUM 6" OVERLAP AND SECURELY SEALED.
7. SEDIMENTATION DEPOSITS SHALL BE REMOVED WHEN IT REACHES ONE HALF THE HEIGHT OF THE SILT FENCE.
8. SILT FENCE SHALL NOT BE USED IN A WATER COURSE.
9. UPON ESTABLISHMENT OF GROUND COVER ON DISTURBED AREAS AND WHEN DIRECTED BY THE ENGINEER, FENCE WILL BE REMOVED AND ANY SEDIMENTATION WILL BE THINLY SPREAD UPON EXISTING GROUND OVER.
10. SILT FENCE SHALL BE INSPECTED BY CONTRACTOR WEEKLY AND FOLLOWING EACH STORM EVENT.



2 TUBULAR COMPOST FILTER SOCK DETAIL
C-04 NOT TO SCALE

NOTES:

1. TUBULAR COMPOST FILTER SOCK SHALL BE 100% BIODEGRADABLE



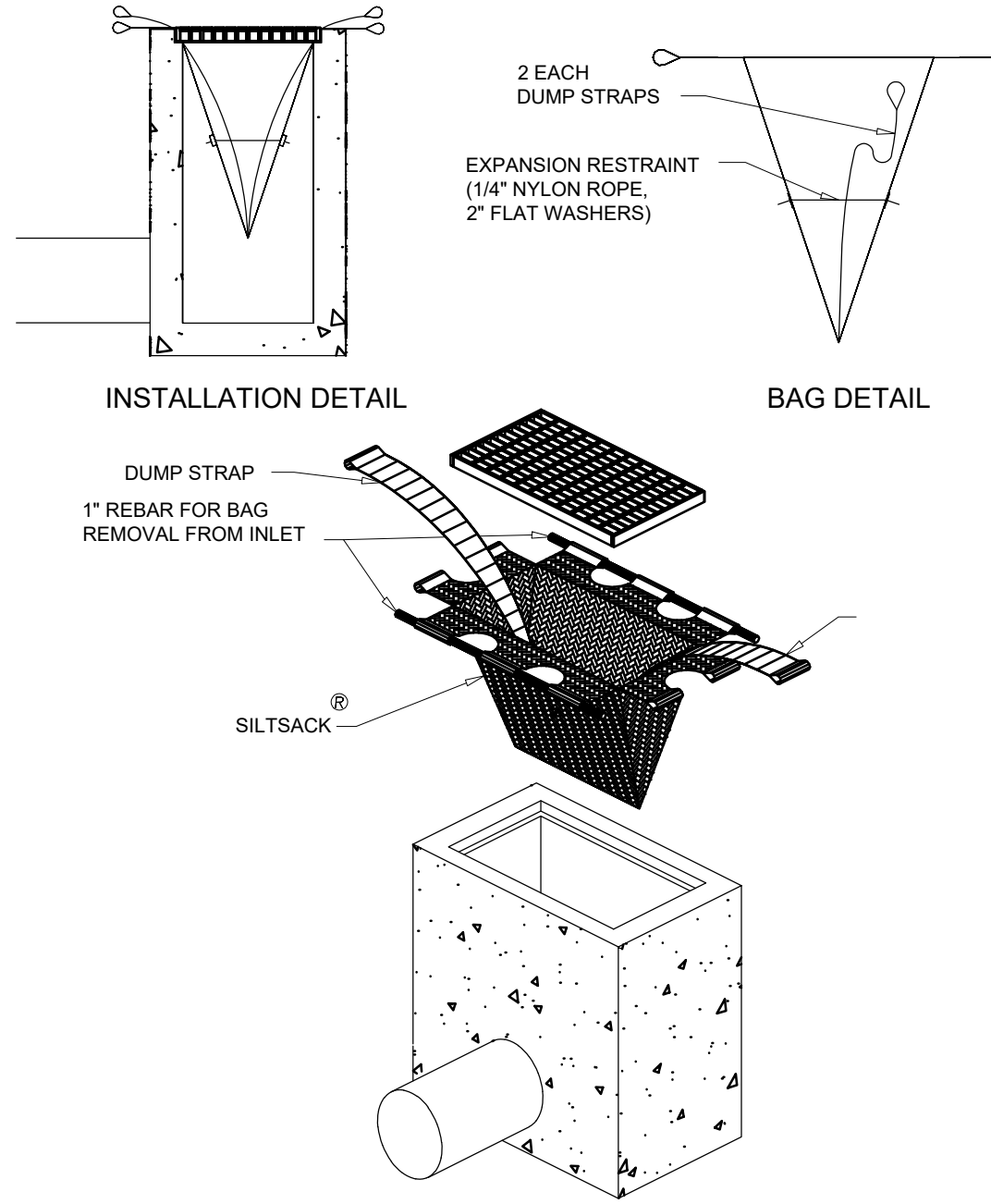
3 CATCH BASIN INLET FILTER DETAIL
C-04 NOT TO SCALE

NOTES:

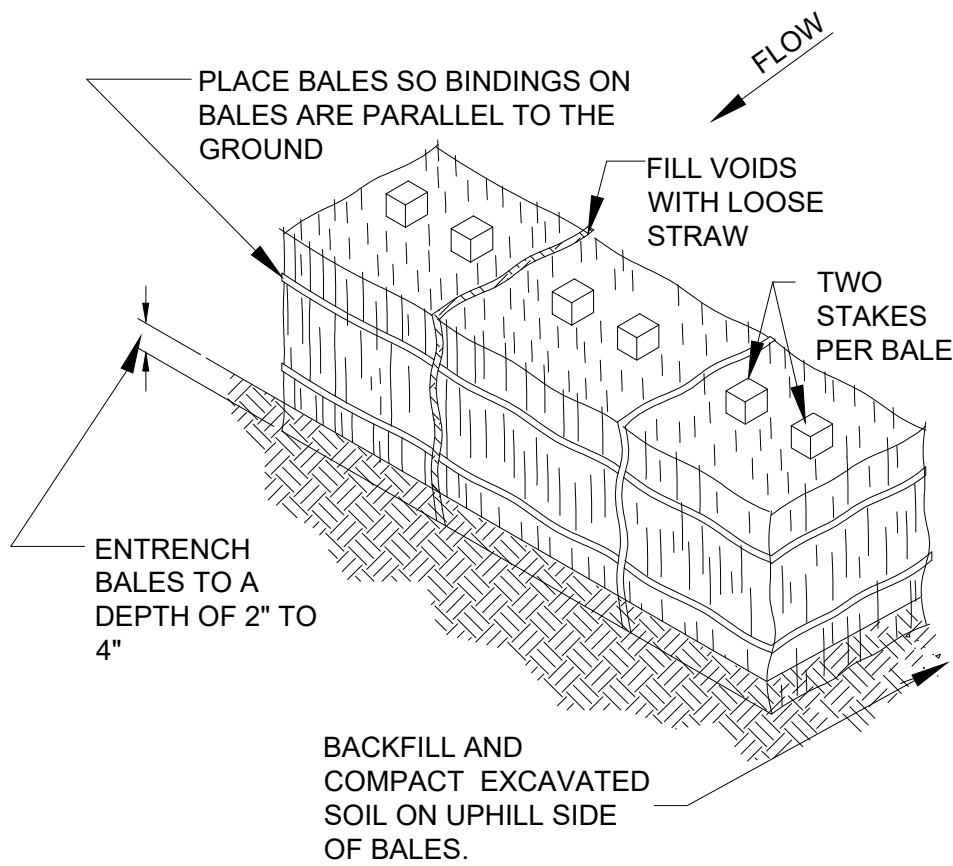
1. FILTER FABRIC AND WIRE MESH WITH 1/2" OPENINGS WILL BE PLACED OVER CURB INLET OPENING AND UNDER GRATE SO THAT AT LEAST 12 INCHES OF FABRIC AND WIRE MESH EXTENDS BEYOND ALL EDGES OF THE EXISTING CATCH BASIN.
2. CONTRACTOR TO CLEAN FILTER FABRIC AND STONE AFTER EVERY STORM OR WHEN INLET BECOMES CLOGGED.
3. FILTER FABRIC AND WIRE MESH TO BE INSTALLED IN SIMILAR FASHION FOR INLETS WITHOUT CURB OPENING OR WITHOUT GRATE.
4. THE INLET FILTER WILL BE INSTALLED PRIOR TO ANY EXCAVATION AND WILL REMAIN UNTIL TEMPORARY PAVEMENT IS COMPLETED.
5. OVERFLOW OPENING SHALL SAFELY PASS FLOWS GREATER THAN THE 1 YEAR, 24 HOUR STORM.
6. INSTALL SILT SACK IN ALL CATCH BASINS WITHOUT A VERTICAL OPENING.

ENVIRONMENTAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION WHERE INDICATED ON THE CONTRACT DOCUMENTS OR AS DIRECTED BY THE TOWN OR ENGINEER.
2. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE IN ACCORDANCE WITH THE APPROVED PLAN AND THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, AND SHALL BE INSTALLED PRIOR TO ANY SOIL DISTURBANCE (INCLUDING TREE CLEARING), AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED AND THEIR REMOVAL IS AUTHORIZED BY THE TOWN OR ENGINEER.
3. PRIOR TO ANY WORK BEING PERFORMED AT THE SITE, THE CONTRACTOR SHALL INFORM THE TOWN AND ENGINEER IN WRITING OF THE NAME, ADDRESS, BUSINESS, AND EMERGENCY PHONE NUMBERS OF THE PERSON(S) WHO WILL BE RESPONSIBLE FOR ENSURING COMPLIANCE WITH THE SOIL EROSION AND SEDIMENT CONTROL PLAN AND THESE CONDITIONS.
4. CONTRACTOR SHALL STAKE OUT LIMITS OF SELECTIVE CUTTING PRIOR TO STARTING WORK. CONTRACTOR SHALL CONTACT THE APPROPRIATE STATE AND/OR MUNICIPAL AGENCIES AND THE ENGINEER FOR FIELD INSPECTION OF LIMITS OF SELECTIVE CUTTING AND IDENTIFICATION OF ANY TREES TO REMAIN OR TO BE REMOVED PRIOR TO STARTING ANY SELECTIVE CUTTING.
5. SELECTIVE CUTTING INCLUDES THE REMOVAL AND DISPOSAL OF TREES, SHRUBS, VEGETATION AND LOGS. ROOT OR STUMP REMOVAL AND SOIL DISTURBANCE SHALL BE MINIMIZED.
6. CONTRACTOR SHALL MINIMIZE ANY ACTIVITIES LOCATED WITHIN THE DRIPLINES OF EXISTING TREES.
7. AT NO TIME SHALL SILT OR SEDIMENT BE ALLOWED BEYOND THE LIMIT OF WORK (EROSION CONTROLS). THE TOWN AND ENGINEER SHALL BE NOTIFIED WITHIN 24 HOURS IF ANY SILT OR SEDIMENT GOES BEYOND THE LIMIT OF WORK.
8. WORK ZONE WITH TRENCHES SHOULD BE PROTECTED FREE FROM RAINWATER FLOW INTO THE TRENCH FROM ALL DIRECTIONS. CONTRACTOR SHOULD HAVE AN IDEA OF RAINY AND SHOULD MAKE PRECAUTIONS BEFORE THE RAIN DAY.
9. ALL EROSION CONTROL AND SEDIMENTATION MEASURES SHALL BE INSPECTED WEEKLY AND WITHIN TWENTY-FOUR (24) HOURS AFTER A STORM EVENT PRODUCING 0.5 INCHES OR MORE PRECIPITATION. COPIES OF THE WEEKLY STORMWATER MANAGEMENT
10. ALL TEMPORARY SEDIMENT CONTROLS SHALL BE CLEANED WHEN THE CAPACITY HAS BEEN REDUCED BY 50%. ALL DEBRIS IS TO BE REMOVED FROM SITE AND DISPOSED OF PROPERLY IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS. NO DEBRIS IS TO REMAIN ON SITE. A CLEAN OUT ELEVATION SHALL BE IDENTIFIED ON A MARKER INSTALLED ON THE SITE. A DUMPSTER SHOULD BE CHOSED FOR SUITABLE DISPOSAL OF DEBRIS.
11. THE SITE SHALL BE GRADED AND MAINTAINED SO THAT ALL STORMWATER RUNOFF IS DIVERTED TO SOIL EROSION AND SEDIMENT CONTROL FACILITIES.
12. STOCKPILES SHALL NOT BE LOCATED WITHIN 150 FEET OF A FLOODPLAIN, SLOPE, DRAINAGE FACILITY, OR ROADWAY AND SHOULD NOT BE LOCATED ON A PAVED SURFACE.
13. HAYBALES, SILT FENCE, OR OTHER APPROVED METHOD SHALL BE PROPERLY ENTRENCHED AT THE BASE OF THE STOCKPILE.
14. PORTIONS OF THE WORK MAY FLOOD DURING DIFFERENT TIMES OF THE YEAR. CONTRACTOR SHALL COORDINATE THE WORK ACCORDINGLY.
15. WATER FROM DEWATERING OPERATIONS SHALL BE DISCHARGED INTO A DEWATERING BAG PRIOR TO A SURFACE WATER BODY.
16. PREVENTATIVE AND CONTAINMENT MEASURES SHALL BE TAKEN TO AVOID SPILLAGE AND RELEASE OF PETROLEUM PRODUCTS AND OTHER POLLUTANTS. IN THE EVENT OF ANY SPILLAGE, PROMPT REMEDIAL ACTION SHALL BE TAKEN IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
17. STORAGE OF EQUIPMENT, CONSTRUCTION MATERIAL OR EXCAVATION MATERIAL IS PROHIBITED IN REGULATED AREAS. CONTRACTOR SHALL PROVIDE AND MAINTAIN SPILL CONTAINMENT AND EROSION CONTROL AS DIRECTED BY THE ENGINEER OR PROVIDE A MINIMUM DISTANCE BETWEEN REGULATED AREAS AND CONTRACTOR STORAGE AREAS OF 200 FEET. REGULATED AREAS INCLUDE WETLANDS AND THE 100-YEAR FLOOD PLAIN.
18. EQUIPMENT FUELING SHALL BE PERFORMED WITHIN A SPILL CONTAINMENT AREA, OR AT A MINIMUM OF 200 FEET FROM REGULATED AREAS AS APPROVED BY THE ENGINEER OR AUTHORITY.
19. WHERE TREES THAT REMAIN MAY POSSIBLY BE DEFACED, BRUISED, INJURED OR DAMAGED BY THE CONTRACTOR'S EQUIPMENT OR OTHER OPERATIONS, ADEQUATE PROTECTION SHALL BE MADE AROUND THEM. MONUMENTS AND MARKERS SHALL BE PROTECTED SIMILARLY BEFORE BEGINNING OPERATIONS NEAR THEM. ANY TREES THAT ARE DAMAGED SHALL BE REPLACED IN-KIND, WHERE DIRECTED BY ENGINEER.
20. A STABILIZED CONSTRUCTION ACCESS SHALL BE INSTALLED WHEREVER AN EARTHEN ROAD INTERSECTS WITH A PAVED ROAD. DIMENSIONS SHALL BE IN ACCORDANCE WITH THE STATE EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS.
21. PAVED ROADWAYS SHALL BE KEPT CLEAN AT ALL TIMES. A MECHANICAL SWEEPER SHALL BE KEPT ON SITE AND USED AS REQUIRED.
22. ANY DISTURBED AREA THAT WILL BE LEFT EXPOSED FOR MORE THAN THIRTY (30) DAYS AND NOT SUBJECT TO CONSTRUCTION TRAFFIC SHALL IMMEDIATELY RECEIVE TEMPORARY SEEDING, BE MULCHED WITH STRAW OR HAY AND TACKED, OR STABILIZED THROUGH THE USE OF OTHER APPROVED MEANS.
23. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUCH AS STEEP SLOPES, SANDY SOILS, OR WET CONDITIONS SUBJECT TO EROSION, SHALL BE STABILIZED.
24. PERMANENT VEGETATION SHALL BE ESTABLISHED ON EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING. IF FINAL GRADING IS PERFORMED OUTSIDE THE GROWING SEASON, TEMPORARY STABILIZATION SHALL BE APPLIED AND MAINTAINED UNTIL PERMANENT VEGETATION CAN BE ESTABLISHED DURING THE FOLLOWING GROWING SEASON. SEED MIX AND VEGETATION SHALL BE IN ACCORDANCE WITH THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS.
25. BEFORE DISCHARGE POINTS BECOME OPERATIONAL, ALL STORM DRAINAGE OUTLETS SHALL BE STABILIZED AS REQUIRED.
26. DURING AND AFTER CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND UPKEEP OF THE DRAINAGE STRUCTURES, VEGETATION COVER, AND ANY OTHER STORMWATER MEASURES DEEMED APPROPRIATE BY THE TOWN OR ENGINEER.
27. THE TOWN OR ENGINEER MAY REQUEST ADDITIONAL MEASURES TO MINIMIZE ON SITE OR OFF SITE EROSION PROBLEMS DURING CONSTRUCTION.



4 SILTSACK DETAIL
C-04 NOT TO SCALE



5 HAY BALE INSTALLATION DETAIL
C-04 NOT TO SCALE

1. THE HAY BALES SHALL BE PLACED AS NECESSARY WHERE SHOWN ON THE CONTRACT DRAWINGS AND AS DIRECTED BY THE ENGINEER OR BY TOWN AGENCIES HAVING JURISDICTION TO CONTROL THE MOVEMENT OF SEDIMENT. ALL HAY BALES SHALL BE PLACED WITHIN THE EASEMENT.
2. BALES SHOULD BE ENTRENCHED 2 TO 4 INCHES AND TIGHTLY BUTTED TOGETHER. BALES CAN BE SUCCESSFULLY PLACED WITHOUT A TRENCH IF GOOD GROUND CONTACT IS MADE. REMOVE HEAVY BRUSH AND FILL ALL VOIDS WITH LOOSE STRAW.
3. HAY BALES SHALL BE INSTALLED FAR ENOUGH UP THE SLOPE SO THAT THE BOTTOM OF THE HAY BALES' END IS HIGHER THAN THE TOP OF THE LOWEST PORTION OF THE HAY BALES.
4. WHEN SEDIMENTATION DEPOSITS REACH WITHIN 3" OF THE TOP OF BALES, REMOVE SEDIMENTATION OR ADD ADDITIONAL BALES DIRECTLY BEHIND FIRST ROW OF BALES AS DIRECTED BY ENGINEER.
5. UPON ESTABLISHMENT OF GROUND COVER ON DISTURBED AREAS AND WHEN DIRECTED BY THE ENGINEER, HAY BALES WILL BE REMOVED AND USED AS MULCH. ANY SEDIMENTATION WILL BE THINLY SPREAD UPON ESTABLISHED GROUND COVER.
6. HAY BALES SHALL BE INSPECTED BY CONTRACTOR WEEKLY AND FOLLOWING EACH STORM EVENT.

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REPRODUCED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.				

Professional Engineer's Name

Professional Engineer's No.

State

NY

Designed by

Date Signed

Project Mgr.

Drawn by

Checked by

100% PROGRESS
DESIGN - NOT FOR
CONSTRUCTION



ARCADIS OF NEW YORK, INC.

CLARKSTOWN HIGHWAY GARAGE EXPANSION • CLARKSTOWN, NY

EROSION AND SEDIMENT CONTROL DETAILS

ARCADIS Project No.

30171703

Date : JUNE 2024

ARCADIS OF NEW YORK, INC.

201 FULLER ROAD

SUITE 201

ALBANY, NY 12203

C-04

Appendix B

Soil Resource Report



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Rockland County, New York



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

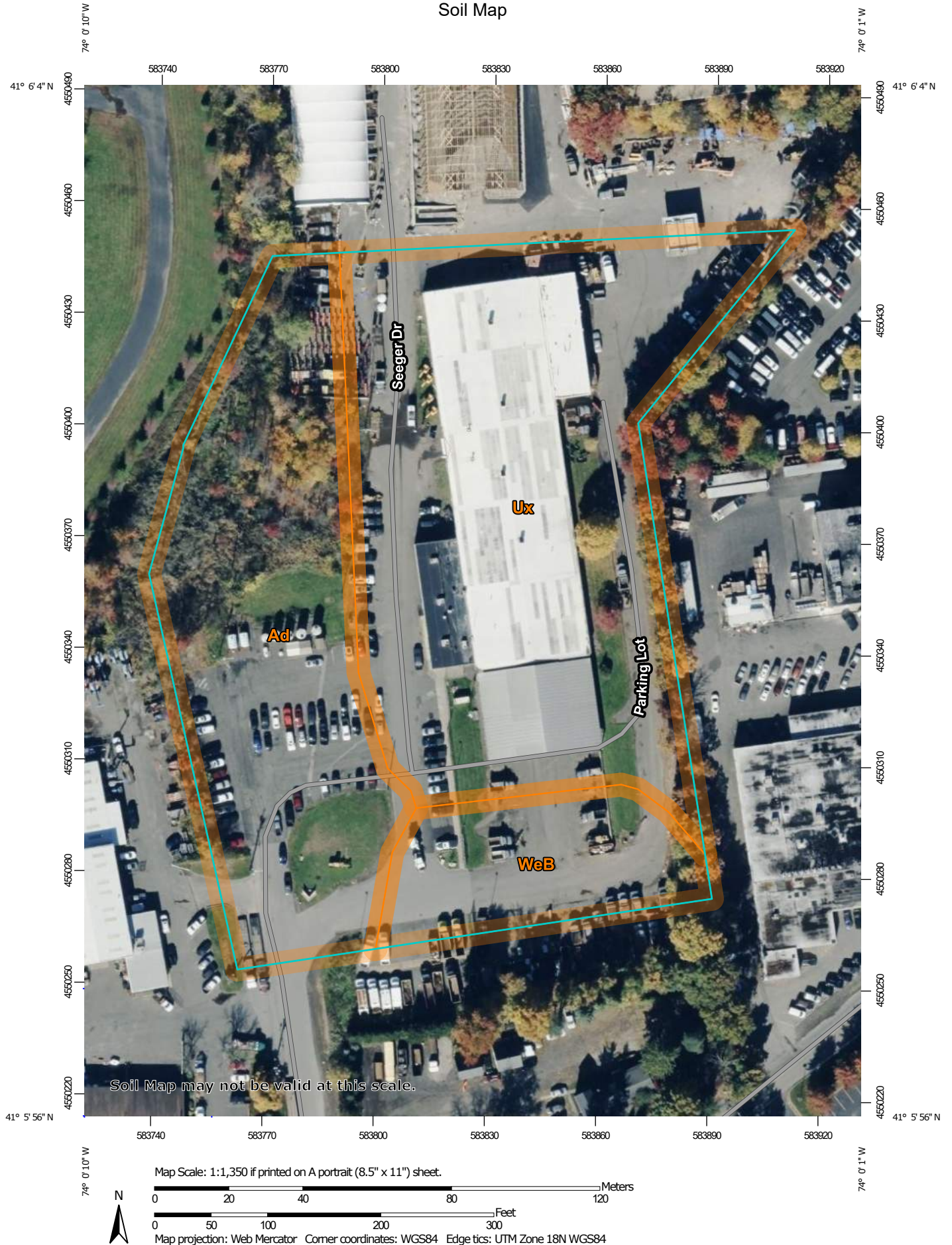
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockland County, New York

Survey Area Data: Version 21, Sep 6, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 21, 2022—Oct 27, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ad	Alden silt loam	2.1	34.8%
Ux	Urban land	3.3	53.8%
WeB	Wethersfield gravelly silt loam, 3 to 8 percent slopes	0.7	11.4%
Totals for Area of Interest		6.1	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

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development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockland County, New York

Ad—Alden silt loam

Map Unit Setting

National map unit symbol: 9v3r
Elevation: 300 to 1,500 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Alden and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alden

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: A silty mantle of local deposition overlying loamy till

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 33 inches: silt loam
H3 - 33 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F144AY040NY - Semi-Rich Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Alden, very stony

Percent of map unit: 5 percent
Landform: Depressions

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Hydric soil rating: Yes

Adrian

Percent of map unit: 5 percent

Landform: Marshes, swamps

Hydric soil rating: Yes

Rippowam

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: Yes

Sloan

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: Yes

Ux—Urban land

Map Unit Setting

National map unit symbol: 9v5g

Mean annual precipitation: 47 to 50 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 135 to 215 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 75 percent

Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Riverhead

Percent of map unit: 5 percent

Hydric soil rating: No

Yalesville

Percent of map unit: 5 percent

Hydric soil rating: No

Udorthents

Percent of map unit: 5 percent

Hydric soil rating: No

Udorthents, wet substratum

Percent of map unit: 5 percent

Hydric soil rating: No

Holyoke

Percent of map unit: 5 percent

Hydric soil rating: No

WeB—Wethersfield gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v5l

Elevation: 30 to 690 feet

Mean annual precipitation: 47 to 50 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 135 to 215 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Wethersfield and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wethersfield

Setting

Landform: Till plains, hills

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Crest

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy acid till derived mainly from reddish sandstone, shale, and conglomerate, with some basalt

Typical profile

H1 - 0 to 13 inches: gravelly silt loam

H2 - 13 to 22 inches: gravelly loam

H3 - 22 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 20 to 38 inches to densic material

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.4 inches)

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Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F145XY012CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 5 percent
Hydric soil rating: No

Cheshire

Percent of map unit: 5 percent
Hydric soil rating: No

Riverhead

Percent of map unit: 5 percent
Hydric soil rating: No

Wallington

Percent of map unit: 5 percent
Hydric soil rating: No

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Custom Soil Resource Report

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United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C

Calculations

Pre-Construction									
Contribution Area	la ¹	p ²	la/P	CN _{pre} ³	T _c ⁴	q _u ⁵	WQ _v (watershed inches)	A (mi ²)	Q _p ⁶
Area 1	0.17	3.55	0.0490	92.00	0.04	728.02	1.0875	0.0014	1.09
Area 2	0.15	3.55	0.0425	93.03	0.03	735.50	1.14555	0.0014	1.15
Area 3	0.15	3.55	0.0428	93.40	0.20	550.00	1.18875	0.0015	0.99
	Composit Curve Number			92.83	Total Peak Discharge				3.22
1 -Initial Abstraction (in) 2 - 2-year, 24-hour Rainfall (in) 3 - Curve Number 4 - Travel Concentration 5- The Unit Peak Discharge, in cfs/mi2 /Inch 6 - Peak Discharge, in cfs									
POI ID	p ¹ (in)	A ² (acres)	l ³	R _v ⁴	WQ _v ⁵ (ac-ft)	WQ _v ⁵ (ft ³)			
1	1.5	0.88	75	0.725	0.08	3,474			
2	1.5	0.87	79.3	0.7637	0.08	3,618			
3	1.5	0.97	82.5	0.7925	0.10	4,186			
Total						11,277			
1 - 90% Rainfall Event Number (see Figure 4.1 NY Stormwater Design Manual) 2 - Contributing Area (acres) 3 - Percent Impervious Cover 4 - Volumetric Runoff Coefficient, R _v = 0.05 + 0.009(l) 5 - Water Quality Storage Volume, WQ _v = P*R _v *A/12									

Post- Construction									
Contribution Area	la	P	la/P	CNpost	Tc	qu	WQv (watershed inches)	A (mi^2)	Qp
Area 1	0.04	3.55	0.0115	98.00	0.05	719.90	1.425	0.0014	1.41
Area 2	0.11	3.55	0.0296	95.30	0.06	710.00	1.223	0.0014	1.18
Area 3	0.06	3.55	0.0175	97.30	0.05	722.10	1.371	0.0015	1.50
	Composit Curve Number			96.89	Total Peak Discharge				4.09
1 -Initial Abstraction (in) 2 - 2-year, 24-hour Rainfall (in) 3 - Curve Number 4 - Travel Concentration 5- The Unit Peak Discharge, in cfs/mi2 /Inch 6 - Peak Discharge, in cfs									
POI ID	p ¹ (in)	A ² (acres)	l ³	R _v ⁴	WQ _v ⁵ (ac-ft)	WQ _v ⁵ (ft ³)			
1	1.5	0.88	100	0.95	0.10	4,552			
2	1.5	0.87	85.06	0.81554	0.09	3,863			
3	1.5	0.97	96	0.914	0.11	4,827			
Total						13,243			
1 - 90% Rainfall Event Number (see Figure 4.1 NY Stormwater Design Manual) 2 - Contributing Area (acres) 3 - Percent Impervious Cover 4 - Volumetric Runoff Coefficient, $R_v = 0.05 + 0.009(l)$ 5 - Water Quality Storage Volume, $WQ_v = P \cdot R_v \cdot A / 12$									

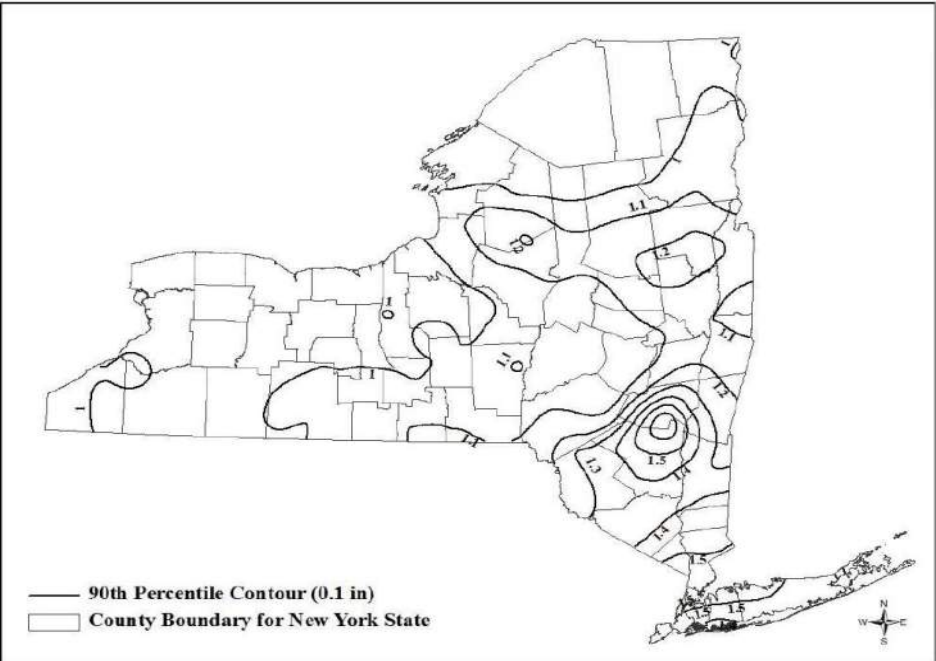


Figure 4.1 90th Percentile Rainfall in New York State (NYSDEC, 2013)

Equations	
	$WQ_v = \frac{P * R_v * A}{12}$
Where:	<p> WQ_v = water quality volume (in acre-feet) P = 90% Rainfall Event Number (see Figure 4.1) R_v = 0.05 + 0.009(I), where I is percent impervious cover A = contributing area (acres) </p>
	$Q_p = q_u * A * WQ_v$ <p> where Q_p = the peak discharge, in cfs q_u = the unit peak discharge, in cfs/mi²/inch A = drainage area, in square miles WQ_v = Water Quality Volume, in watershed inches </p>
	<p>Exhibit 4 (unit peak discharges for SCS type I, IA, II, and III distributions):</p> $\log(q_u) = C_o + C_1 \log(T_c) + C_2 [\log(T_c)]^2$ <p>where</p> <p> q_u = unit peak discharge (csm/in) T_c = time of concentration (hr) (minimum, 0.1; maximum, 10.0) C₀, C₁, C₂ = coefficients from table F-1 </p>
	<p>For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:</p> $T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \quad \text{[eq. 3-3]}$ <p>where:</p> <p> T_t = travel time (hr), n = Manning's roughness coefficient (table 3-1) L = flow length (ft) P₂ = 2-year, 24-hour rainfall (in) s = slope of hydraulic grade line (land slope, ft/ft) </p>

Appendix D

Notice of Intent



Notice of Intent (“NOI”)
New York State Department of Environmental Conservation

Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

**NOTICE OF INTENT for Stormwater Discharges Associated with
Construction Activity UNDER SPDES GENERAL PERMIT #GP-02-01**

NYR
(for DEC use only)

IMPORTANT: All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this general permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan (SWPPP) prior to completing and submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

Section I. Applicant/Activity Information

1. Owner/Operator Name:

2a. Mailing Address:

2b. City

2c. State

2d. Zip

3. Contact Person: 3a. First Name:
3b. Last Name:

3c. Phone:

3d. E-mail:

4a. Site/Project Name:

4b. Existing use of the site:

5a. Street Address:

5b. City:

State:
NY

5c. Zip

6. County:

7. Site Location: 7a. X Coordinates: _____ 7b. Y coordinates: _____

Section II. Disturbance Activity/Discharge Characteristics

8. Future use of the site:

9. Duration of disturbance activity (use mm/dd/yyyy) from: 12 to:

10. Total site acreage: (acres)

11. Total acres of disturbed area of overall plan of development or sale:

12. Soil (Hydrologic Soil Group):

13. What is the maximum slope of disturbed area: %

14. What is the percentage of impervious area of the site? 14a. before commencement of the project %
14b. after completion of the project: %

15. Will there be permanent stormwater management practices? yes no

16. Is this a phased project? yes no

Section III. Receiving System(s)

17. Does any part of the project lie within a regulated 100-year flood plain? yes no

18. Does the site/activity lie within the boundaries of the New York City watershed? yes no

19. Does runoff from site enter a storm sewer or ditch maintained by a local, Federal or State governmental unit (MS4)? yes no
If the answer to 19 is no, skip to question 20.

19a. Provide the name of the government owning the storm sewer system:

19b. Is the MS4 a “regulated MS4” as defined under 40 CFR Section 122.32? yes no don’t know

19c. Does the MS4 have a SPDES permit for their storm sewer system? yes no don’t know

19d. Is the runoff from the site tributary to a Combined Sewer Overflow (CSO)? yes no

20. What is the name of the nearest surface water body into which the runoff will enter?

21. Does the runoff discharge to a receiving water identified as 303(d) listed segment , or “TMDL” water , or neither ?

Section IV. Stormwater Pollution Prevention Plan:

22. What components are required for the SWPPP? (Consult the SWPPP and Stormwater Permit Process flow chart and check all that apply): 22a. Erosion and Sediment Control Plan 22b. Water Quality and Quantity Controls

23. Is the Construction Sequence Schedule for the planned management practices prepared? yes no		
Will the Stormwater Pollution Prevention Plan be in conformance with: 24a. local government requirements? yes no 24b. NYSDEC requirements? yes no If the answer to 24b. is yes, skip to Section VI.		
Section V. Supplemental Information (only if you answered "no" to question 24.b.)		
25. Before submitting this NOI, you must have your SWPPP certified by a licensed Professional. This certification must state that the SWPPP has been developed in a manner which will ensure compliance with water quality standards and with the substantive intent of this permit (see general permit for additional information). Is your plan certified by a licensed Professional? yes no <ul style="list-style-type: none"> Do not submit your SWPPP to DEC unless requested. A copy of your SWPPP must be submitted to the local jurisdiction(s) as required under Part III, subsection B.2 (also see question #29 below). State each deviation from the Department's Technical Standards, reasons supporting each deviation request and an analysis of the water quality impacts in your SWPPP. Use Section VII below to summarize the justification statement in one paragraph. Allow sixty (60) days from the receipt of your completed application for permit coverage to provide DEC an opportunity to review the application and supporting information. 		
Section VI. Reviews and Approvals		
Has your SWPPP been reviewed by: 26a. local Soil and Water Conservation District 26b. Professional Engineer 26c. Certified Professional Erosion Control Specialist 26d. Licensed Landscape Architect. 26e. None		
27. Are there other DEC permits required or already obtained for this project? yes no 28. If the answer to 27 is no, skip to question 29. 28a. If this NOI is submitted for the purpose of continuing previous coverage under the general permit for stormwater runoff from construction activities (GP-93-06), please indicate the SPDES reference number assigned under GP-93-06: NYR1 _____ 28b. If there is another SPDES permit, please indicate the permit number: NY _____ 28c. If there are other DEC permits, please provide one of the permit numbers: _____		
29. Has a copy of your SWPPP been submitted to the governing jurisdiction as required by the permit? yes no		
Section VII. Details (use this space, maximum of 650 characters, to further explain answers where necessary).		
Section VIII. Certification		
I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I also certify under penalty of law that this document and the corresponding documents were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction. and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.		
30a. Printed Name:	30b. Title/Position:	30c. Phone:
Signature:	30d. E-mail:	30e. Date:

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